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ABSTRACT

This report presents existing workforce levels, training programs and career potentials and develops staffing level projections (1976-1982) based on available information for the State of Wyoming. The study concerns itself with the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. The format includes workforce profiles, projections, growth and career options for each of the areas investigated. Additional sections of the report outline state legislation and selected post secondary institutions with formal Environmental/Energy programs. A state profile and summary is included for cross-reference. The selected bibliography is appended in the Region VIII report. This document is one in a series of 69 which presents information for each of the states, Washington, D.C., Puerto Rico, and the Virgin Islands, and national and regional summaries. (CS)

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ED147166

# A National Environmental/Energy Workforce Assessment

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SE 023 344

# NATIONAL ENVIRONMENTAL/ENERGY
# WORKFORCE ASSESSMENT

for

# WYOMING

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010
1977

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# TABLE OF CONTENTS

| | Page |
|---|---|
| ILLUSTRATIONS | iii |
| ACKNOWLEDGEMENT | viii |
| PREFACE | x |
| FOREWORD | xi |
| STATE SUMMARY | 1 |
| STATE PROFILE | 14 |
| POLLUTION CONTROL AND ABATEMENT AGENCIES | 16 |
| POLLUTION CONTROL AND ABATEMENT PROGRAMS | 27 |
| I. Air | 28 |
| II. Noise | 40 |
| III. Pesticides | 44 |
| IV. Potable Water | 58 |
| V. Radiation | 72 |
| VI. Solid Waste | 82 |
| VII. Wastewater | 87 |
| VIII. Energy | 98 |
| SELECTED POST SECONDARY INSTITUTIONS WITH FORMAL ENVIRONMENTAL/ENERGY PROGRAMS | 108 |
| STATE LEGISLATION | 114 |

NOTE: The Selected Bibliography is appended to each Regional Report.

# ILLUSTRATIONS

| Figure | | Page |
|---|---|---|
| 1 | State of Wyoming, Department of Environmental Quality (DEQ), Organizational Chart. | 18 |
| 2 | Department of Environmental Quality (DEQ), Administration Division, Organizational Chart. | 19 |
| 3 | Wyoming Department of Agriculture, Organizational Chart. | 22 |
| 4 | Wyoming Department of Agriculture, Functions of the Divisions, 1976. | 23 |
| 5 | State of Wyoming, Department of Health & Social Services, Organizational Chart. | 25 |
| 6 | Department of Health & Social Services, Division of Health & Medical Services, Organizational Chart. | 26 |
| 7 | Department of Environmental Quality (DEQ), Air Quality Division, Organizational Chart. | 31 |
| 8 | Department of Environmental Quality (DEQ), Air Quality Division Areas. | 32 |
| 9 | Department of Environmental Quality (DEQ), Water Quality Division Areas. | 62 |
| 10 | Department of Environmental Quality (DEQ), Water Quality Division, Potable Water & Wastewater, Organization Chart. | 63 |
| 11 | Department of Agriculture, Division of Laboratories, Organizational Chart. | 66 |

| Figure | | Page |
|---|---|---|
| 12 | Department of Health & Social Services, Division of Health & Medical Services, Radiological Health Services, Organizational Chart. | 74 |
| 13 | Department of Environmental Quality (DEQ), Water Quality Division Areas. | 91 |
| 14 | Department of Environmental Quality (DEQ), Water Quality Division, Potable and Wastewater, Organizational Chart. | 92 |
| 15 | Department of Agriculture, Division of Laboratories, Organizational Chart. | 93 |
| 16 | Department of Environmental Quality (DEQ), Land Quality Division, Organizational Chart. | 101 |
| 17 | Department of Environmental Quality (DEQ), Land Quality Division Areas. | 102 |
| 18 | Fuels Related Projects, Wyoming. | 107 |

| Table | | |
|---|---|---|
| I | Wyoming Department of Environmental Quality, Air Quality Division, Current (1976) Staffing Level. | 30 |
| II | Department of Environmental Quality (DEQ), Air Quality Division, Training, FY 1976-FY 1977. | 34 |
| III | State of Wyoming, Legislative & Regulatory Activities, Air Pollution Control & Abatement (Synopsis). | 37 |

6

| Table | | Page |
|---|---|---|
| IV | State of Wyoming, Annual Expenditures, FY 1968-FY 1975, Air Pollution Control and Abatement. | 38 |
| V | State of Wyoming, Municipal Noise Ordinances, 1976. | 41 |
| VI | State of Wyoming, Cooperative Agency Agreements with Wyoming Department of Agriculture, 1976. | 44 |
| VII | Wyoming Department of Agriculture, Pesticides Personnel, Current (1976) Staffing Level. | 46 |
| VIII | Wyoming Department of Agriculture, Pesticides Personnel, Percentage of Time Allocated to Pesticides (1976). | 47 |
| IX | State of Wyoming, Pesticides Personnel, Current (1976) Staffing Level (estimated). | 48 |
| X | State of Wyoming, Pesticides Personnel, Applicators, Current (1976) Staffing Level. | 50 |
| XI | Wyoming Department of Agriculture, Pesticides Personnel, Workforce Projections to 1982 (est.). | 51 |
| XII | State of Wyoming, Pesticides Personnel, Workforce Projections to 1982 (est.). | 52 |
| XIII | State of Wyoming, Pesticides Personnel, Certified Applicators, Workforce Projections to 1982 (est.). | 53 |
| XIV | State of Wyoming, Summary of Commercial Pesticides Applicator Examinations & Certifications (1976). | 55 |
| XV | State of Wyoming, Agencies & Activities, Water - 1976. | 58 |
| XVI | State of Wyoming, Water Facilities - 1976, Illustrating Source, Treatment & Classification. | 60 |
| XVII | Wyoming Department of Environmental Quality, Water Quality Division, Potable Water Personnel, Current (1976) Staffing Level. | 61 |

| Table | | Page |
|---|---|---|
| XVIII | State of Wyoming, Water Treatment & Water Distribution System Operators, Current (1976) Staffing Level. | 65 |
| XIX | State of Wyoming, Water Treatment & Water Distribution System Operators, Workforce Projections to 1982 (est.). | 67 |
| XX | State of Wyoming, Water - Training, 1976. | 69 |
| XXI | State of Wyoming, Users of Radioactive Materials, Current (1976) Registration. | 73 |
| XXII | State of Wyoming, X-Ray Registrants & Inspections (1976). | 75 |
| XXIII | State of Wyoming, Radiation Personnel, Current (1976) Staffing Level (estimated). | 76 |
| XXIV | Department of Health & Social Services, Division of Health & Medical Service, Radiological Health Services Section, Workforce Projections to 1982 (est.). | 77 |
| XXV | State of Wyoming, Radiation Personnel, Workforce Projections to 1982 (est.). | 78 |
| XXVI | State of Wyoming, Educational & Training Programs - Radiation Control. | 80 |
| XXVII | Department of Environmental Quality, Solid Waste Management Program, Current (1976) Staffing Level. | 83 |
| XXVIII | State of Wyoming, Waste Water Treatment Facilities - 1976, Illustrating Treatment & Classification. | 89 |
| XXIX | Wyoming Department of Environmental Quality, Water Quality Division, Waste Water Personnel, Current (1976) Staffing Level. | 90 |
| XXX | State of Wyoming, Waste Water Treatment Plant Operating Personnel, Current (1976) Staffing Level. | 94 |

| Table | | Page |
|---|---|---|
| XXXI | State of Wyoming, Waste Water Treatment Plant Operating Personnel, Workforce Projections to 1982 (est.). | 95 |
| XXXII | State of Wyoming - Waste Water Training, 1976. | 96 |
| XXXIII | Department of Environmental Quality, Land Quality Division, Current (1976) Staffing Level. | 100 |
| XXXIV | Wyoming Oil & Gas Commission, Current (1976) Staffing Level. | 103 |
| XXXV | Department of Environmental Quality, Land Quality Division, Workforce Projections to 1982 (est.). | 104 |

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Wyoming Department of Agriculture

The Honorable Bill Nation
Mayor
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Mr. Patrick Gamroth
State Training Officer
Wyoming Department of Environmental Quality

To these gentlemen - the spirit of the west and the personification of the State of Wyoming - the authors extend their most sincere gratitude.

# PREFACE

The research and development of the NATIONAL ENVIRONMENTAL/ ENERGY WORKFORCE ASSESSMENT project was conducted under the aegis of the U.S. Environmental Protection Agency by the National Field Research Center, Inc., Iowa City, Iowa, and the Denver Regional Office. This report is an assessment of the State of Wyoming and is one of six state reports within Federal Region VIII.

The State of Wyoming Report presents an overview of the current workforce, projections of workforce requirements (1976-1981), training and certification, and career potential in environmental pollution control and abatement. The environmental areas depicted within this report are: air, noise, potable water, pesticides, solid waste, waste water, and energy conservation/conversion.

# FOREWORD

This state report is a product of Phase I of the NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT project in Wyoming. The information contained within this report was obtained by extensive on-site interviews and research of project related materials. The information retrieval was conducted through representative federal, state, and when time allowed, local agencies. Telephone and written surveys were utilized as a secondary research source.

Data which is not documented herein is representative of the best professional judgements of experts currently working in the field.

This study is designed specifically for use as a reference tool at the federal regional level as well as at the state level. It is anticipated that the people of the State of Wyoming will be the beneficiaries of this endeavor.

# National Environmental Energy Workforce Assessment

## Phase I

# WYOMING

## State Summary

## I. AIR

Major air pollution problems are not as prevalent in Wyoming as in some of the other states, and Wyoming air quality is higher than the national standards, for the most part. There are two Air Quality Maintenance Areas (AQMA) in Wyoming as defined by the U.S. EPA Region VIII Administrator. The Wyoming Environmental Quality Act, 1973, authorized the establishment of the Division of Air Quality in the Department of Environmental Quality (DEQ).

Experts within the field of air pollution control and abatement find it difficult to make projections regarding manpower requirements for Wyoming for the near future. The major reason for this reticence lies in the fact that Wyoming is an energy impacted state. With the continuation of coal development and the increase in population and energy related development, a three percent to five percent growth may be anticipated.

Air pollution control career opportunities will be available at the degreed level in limited numbers. Industrial air pollution control equipment is exceedingly expensive and is not apt to be relagated to less than highly expert responsibility. Considerable engineering experience will generally be demanded by industry. In the future, this sector will present the majority of the air pollution control and abatement career opportunities.

## II. NOISE

Wyoming has no noise legislation at the present time. There is no state allocated responsibility for a noise pollution control and abatement program. Wyoming is an agricultural state, and has few of the population-related problems which are common to more urbanized states.

The Department of Environmental Quality has stated that at present there is little need for a noise control program, as problems are not now prevalent enough to necessitate the establishment of one.

At the state level there appears to be no full-time personnel. There are no available figures for the local workforce.

There are several local noise ordinances in the state. Cheyenne, Lander, Powell and Riverton presently have ordinances, as does Casper.

Career opportunities in the state will be limited during the next three to five years. As state and local programs begin to emerge, career opportunities will be more available. These occupations will mostly be representative of degreed engineering categories. Engineering with acoustical expertise will be in demand at the local level and perhaps in energy related industries. New or distinct careers are not expected to emerge at least until the late 1980's.

## III. PESTICIDES

The Wyoming Department of Agriculture has been designated as the agency with primary responsibility for all pesticide related activities and programs in the state. The Department administers forty-one laws. The following impact the environmental area of pesticides: the Predator Animal Control Law; Wyoming Weed & Pest Control Act; Wyoming Environmental Pesticide Control Act of 1973; and the State Entomologist Law.

The Wyoming Department of Agriculture is a leader in the area of pesticides within Region VIII. The State Pesticide Plan has been utilized extensively throughout the region as a prototype for other states attempting to establish regulations and guidelines pursuant to FIFRA. Departmental pesticides objectives include the development, implementation, and maintenance of a program that will comprehensively regulate the labeling, distribution, storage, transportation and disposal of pesticides. The dissemination of up-to-date information, and the granting of technical assistance to users regarding correct all around usage of pesticides are also Departmental pesticides objectives.

Degreed personnel will be required in administrative positions. The number of certified, non-degreed commercial personnel will experience minimal growth, due to increased efficiency.

## IV. WATER

As in most western agricultural states, water is a most valued resource in Wyoming. The state has stepped into an age of great mineral development which carries with it the critical necessity of responsible water usage and extensive planning for the future. At present, there are 3.8 million acre feet of water unused and allotted to the state's future requirements.

The Wyoming Environmental Quality Act of 1973 legislatively allocated the responsibility for drinking water in the state to the Department of Environmental Quality (DEQ), the Water Division. Other agencies working cooperatively with the DEQ include: the Department of Agriculture, the State Engineer and the U.S. Geological Survey.

The Water Quality Division along with the other DEQ Divisions, has experienced a substantial growth since the Department's creation in 1973. The potable water area of the Division will have vast increases in program responsibility should the state assume primacy. The number of operators statewide will increase over the next five years.

New jobs will be created in this field as a consequence of advancing technology, and more stringent federal and state legislation. Opportunities will continue to be available at the operator level.

## V. RADIATION

The major responsibility for radiological health has been delegated to the Department of Health and Social Services, Division of Health and Medical Services, Radiological Health Services Section. The primary responsibility is to reduce and/or prevent unnecessary radiation exposures to the people of Wyoming.

Proposed legislation, intended to give authority to the Section to adopt rules and regulations for the control of radiation, would also allow negotiation with the U.S. Nuclear Regulatory Commission (NRC) in an effort to become an Agreement State.

The Radiologic Health Services Section is understaffed at present. But, increases in this staff are anticipated to be minimal. In the private sector, increases will be in the medical and dental fields.

With the increase in energy-related activities across the state and increased population, career opportunities will be available to a limited degree. Competition is expected to increase among radiation protection specialists and engineering graduates with radiation and nuclear expertise. Although mining and milling do not necessitate large increases in radiation technicians, highly skilled engineers and health physicists will present areas of career opportunity as a result of these activities.

## VI. SOLID WASTE

Solid waste management has not been a critical area of concern to the state in the past, but this program should emerge as an increasingly important element in the overall state plan. As with many other environmental questions, this increased importance will be as a result of energy resource development.

The primary responsibility for solid waste management in Wyoming has been allocated to the Department of Environmental Quality (DEQ). The primary goal is the elimination of improper handling and disposal of solid waste.

There is a possibility that the present statewide workforce could triple or quadruple over the next five years due to energy related activities. This will be especially noticeable in the impending energy related impact on small towns, and the very real possibility of the creation of towns around mining and milling sites where none now exist.

Career opportunities will exist in solid waste management in Wyoming. These may be accentuated if energy development proceeds at the pace forecast by some experts. The upgrading of educational and technical skills will be important. Job opportunities for engineers with hazardous and toxic waste expertise will be available in private industry and government. The acceleration of uranium activities within the state will increase opportunities in the field of solid waste.

## VII. WASTE WATER

Several agencies are involved in waste water activities in the State of Wyoming. The lead agency has been identified as the Department of Environmental Quality (DEQ). The Department of Agriculture is currently involved in extensive waste water activities.

The Wyoming Conservation Commission (of the Department of Agriculture) assists the thirty-nine conservation districts within the state in the development and administration of conservation programs for urban and rural areas. The Conservation Commission and the Department of Environmental Quality are developing a contract and a workplan regarding the P.L. 92-500, Section 208, Water Quality Planning Program.

A one to two percent per annum increase is anticipated for the waste water personnel of the DEQ Water Quality Division. Although the turnover rate is relatively low, it is anticipated that the majority of the estimated staff increases will be the result of new hires as the program is strengthened. Statewide, coal development and increases in uranium mining and milling along with increased population-related problems will necessitate additional treatment plant personnel. Career opportunities in the waste water field will increase. These occupational opportunities will include operators and degreed technical and administrative personnel.

## VIII. ENERGY

There are innumerable programs, offices and agencies currently involved in energy-related activities in Wyoming. The development of energy resources, especially coal and uranium, is closely aligned with problems which impact the environment. Among the agencies involved in energy activities are: the Department of Environmental Quality (DEQ), and the Department of Agriculture.

Increases in the energy pollution control and abatement workforce will occur over the next three to five years. Career opportunities will be available throughout the state. Job categories will be representative of highly skilled, degreed level positions as well as technician level occupations. Specialized engineering and geological skills will be in demand. Expertise relative to Environmental Impact Statements will be sought by the industrial sector, state and local agencies.

Wyoming has established a program which allows for the coordination of state land use-related problems. In conjunction with the land use program, the state has the authority to determine the siting of power plants, and has adopted new property tax measures.

The energy related acitivties ongoing in Wyoming present new challenges to this sparsely populated western state. Coal continues to be exported by rail, at the rate of forty trains per day averaging one hundred cars each.

## STATE OF WYOMING - SUMMARY

### National Environmental/Energy Workforce Assessment
### Pollution Control & Abatement Personnel
### Projected Workforce Requirements (1976-1981)
(estimated)

| Environmental Area | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| AIR | 214 | 220 | 227 | 234 | 241 | 248 | 3% |
| NOISE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| PESTICIDES | 4,695 | 4,836 | 4,981 | 5,130 | 5,284 | 5,443 | 3% |
| POTABLE WATER[1] | 168 | 182 | 210 | 241 | 276 | 316 | 15% |
| RADIATION | 105 | 108 | 111 | 114 | 117 | 121 | 3% |
| SOLID WASTE | 252 | 354 | 454 | 555 | 653 | 756 | 40% |
| WASTEWATER[2] | 193 | 215 | 242 | 271 | 305 | 343 | 13% |
| ENERGY[3] | 30 | 38 | 40 | 42 | 42 | 42 | 7% |
| TOTALS | 5,657 | 5,953 | 6,265 | 6,587 | 6,918 | 7,269 | 5% |

[1] Includes no growth at the state level.

[2] Includes a 2% per annum growth for state level.

[3] Does not include private sector.

## EDUCATION

There are 8,100 students, and 180 programs of study offered in seven academic colleges at the University of Wyoming.

The University of Wyoming, College of Agriculture offers a Bachelor of Science degree with a major in several fields including Entomology and Range Management. The College of Agriculture also conducts research on land reclamation and presents courses relative to strip mining.

Other environmentally related courses of study are available at the University. A graduate program leading to the degrees of Master of Science and Doctor of Philosophy is available through the Department of Atmospheric Science. The Department of Civil and Architectural Engineering offers a Bachelor's, Master's, and Doctorate.

A University-wide organization established to conduct research related to water resources is the Wyoming Water Resource Research Institute (WRRI). The WRRI has established three outdoor resource observatories which are an integral part of this program. Currently the Institute has undertaken research relative to the disposal of sewage, in cooperation with the State Department of Agriculture.

Since 1945, seven community colleges have been established in Wyoming. Casper College was the first two year institution in the state. Casper College offers an A.S. degree in Environmental Health.

## LEGISLATION

The environmental/energy legislation for Wyoming was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Wyoming Environmental Quality Act
Environmental Pesticide Control Act
Protection of Public Water Supply Act
Radioactive Isotopes Law
Solid Waste Law

# National Environmental Energy Workforce Assessment

## Phase I

# WYOMING

## State Report

## STATE PROFILE

Cheyenne, Casper, Laramie and Rock Springs, these names from the Old West are the chief cities in order of population of "The Cowboy State." The 97,914 square miles include highly elevated plateaus and rugged, yet elegant, mountains. The "Equality State" almost square in shape and bordered by six other states - this is Wyoming. With an average elevation of 6,700 feet, second only to its southern neighbor, Colorado, with long, cold, snowy windswept winters and short, hot summers, this is the land of the Shoshone and the Arapahoe - the land of Grand Teton, Yellowstone, Flaming Gorge, Bighorn Canyon and Devil's Tower. Magnificent is this vast and endless country where the sun rises above treeless plateaus dotted with occasional buttes.

The mountain areas are described by the yearly influx of tourists as the most beautiful in the United States. This vast and rugged western land supports the grizzly bear, pronghorn antelope, wapiti, moose, and mountain lion.

Wyoming is a mining and agriculture state. Oil, gas, and uranium are representative of the mining and milling activities. Coal of low sulfur content, and wide seamed deposits has captured the interest of energy hungry Americans. Presently, forty trains per day crisscross the region with up to one hundred coal-laden cars apiece. Ranking second to mining in the economy of Wyoming is agriculture. Dominated by livestock production, Wyoming farmers and ranchers produce cattle, sheep, sugar beets, and wheat. Secondary products of this agricultural land are the rodeo heroes of Cody, Graybull, Sundance and Big Horn.

This magnificent land of the cottonwood tree and Indian Paintbrush, of the Columbine and the Bleeding Heart, has a population of 332,416, a density of 3.4 persons per square mile. A sparse population and a rugged countryside contribute to the independence and self-determination that are the very backbone of these descendents of the original western heroes.

## POLLUTION CONTROL AND ABATEMENT AGENCIES

The following agencies are those which are involved with environmental programs within the state. Each narrative provides a review of the functions and activities of each agency as they relate to environmental programs.

## WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

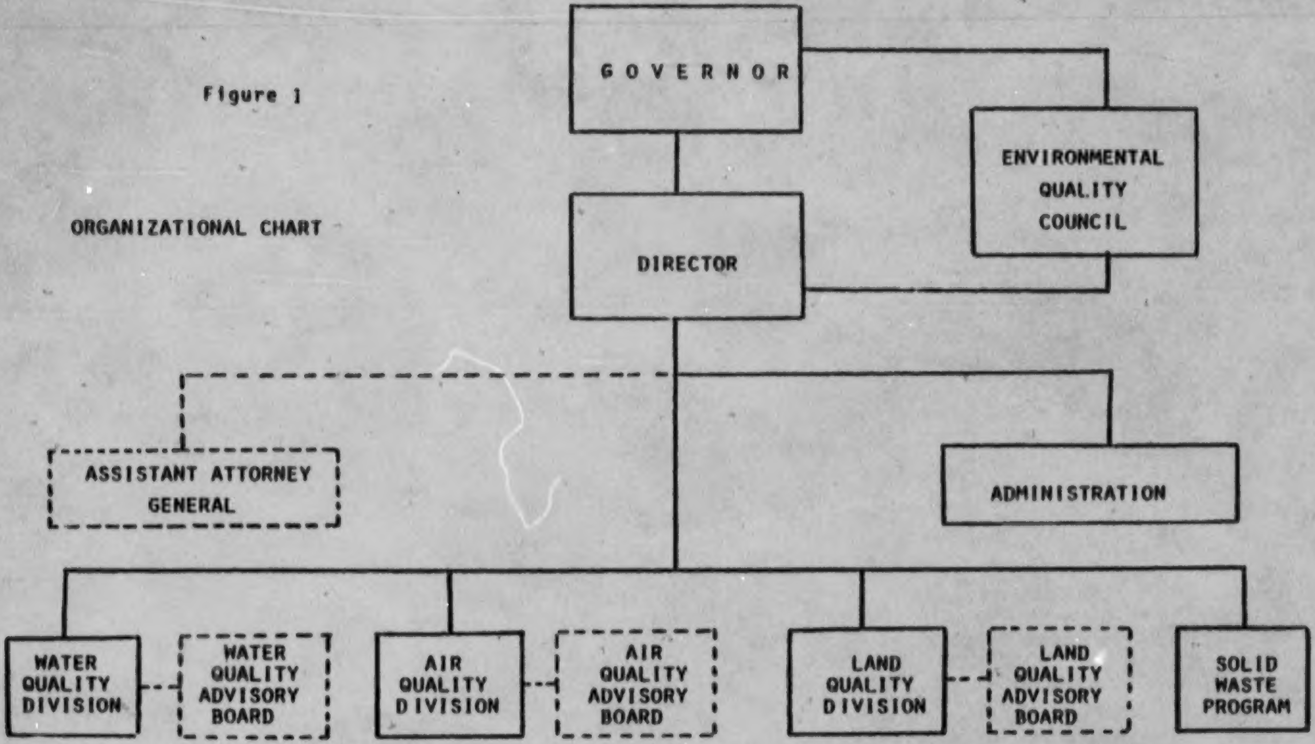
In 1973, in response to the people of Wyoming and their concern for their environment, the state Legislature established the Department of Environmental Quality. The Department is primarily a regulatory agency charged with the responsibilities of the prevention, reduction and elimination of pollution to the air, land, and the water. In keeping with the spirit of the people, the Department is also responsible for the reclamation of lands which have been affected by mining.

Under the Wyoming Environmental Quality Act, 1973, there exists authorization for three divisions: air, land and water; and one program in solid waste management. Although a relatively young Department, this agency has been created and staffed by an outstanding number of specialists drawn for the most part, from other Wyoming state agencies. The total Department of Environmental Quality (DEQ) staff in 1973 was 18; the current (1976) total is 65. Organizational charts depicting the Department and the Administrative Division follow.

## STATE OF WYOMING -
## DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Figure 1

ORGANIZATIONAL CHART


GOVERNOR
ENVIRONMENTAL QUALITY COUNCIL
DIRECTOR
ASSISTANT ATTORNEY GENERAL
ADMINISTRATION
WATER QUALITY DIVISION
WATER QUALITY ADVISORY BOARD
AIR QUALITY DIVISION
AIR QUALITY ADVISORY BOARD
LAND QUALITY DIVISION
LAND QUALITY ADVISORY BOARD
SOLID WASTE PROGRAM

------broken lines indicate advisory capacity

DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

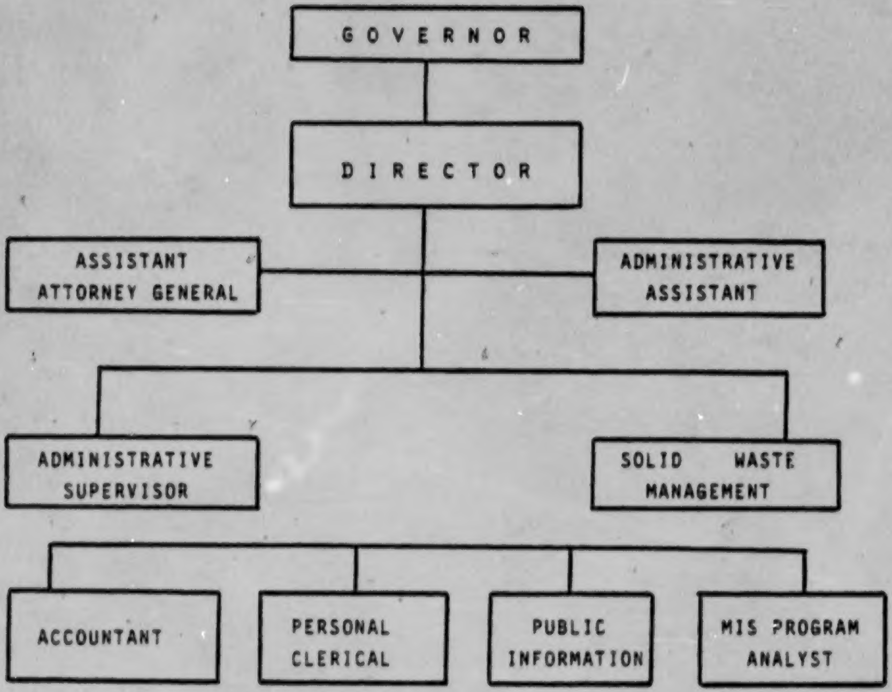


Figure 2

ADMINISTRATIVE ORGANIZATION

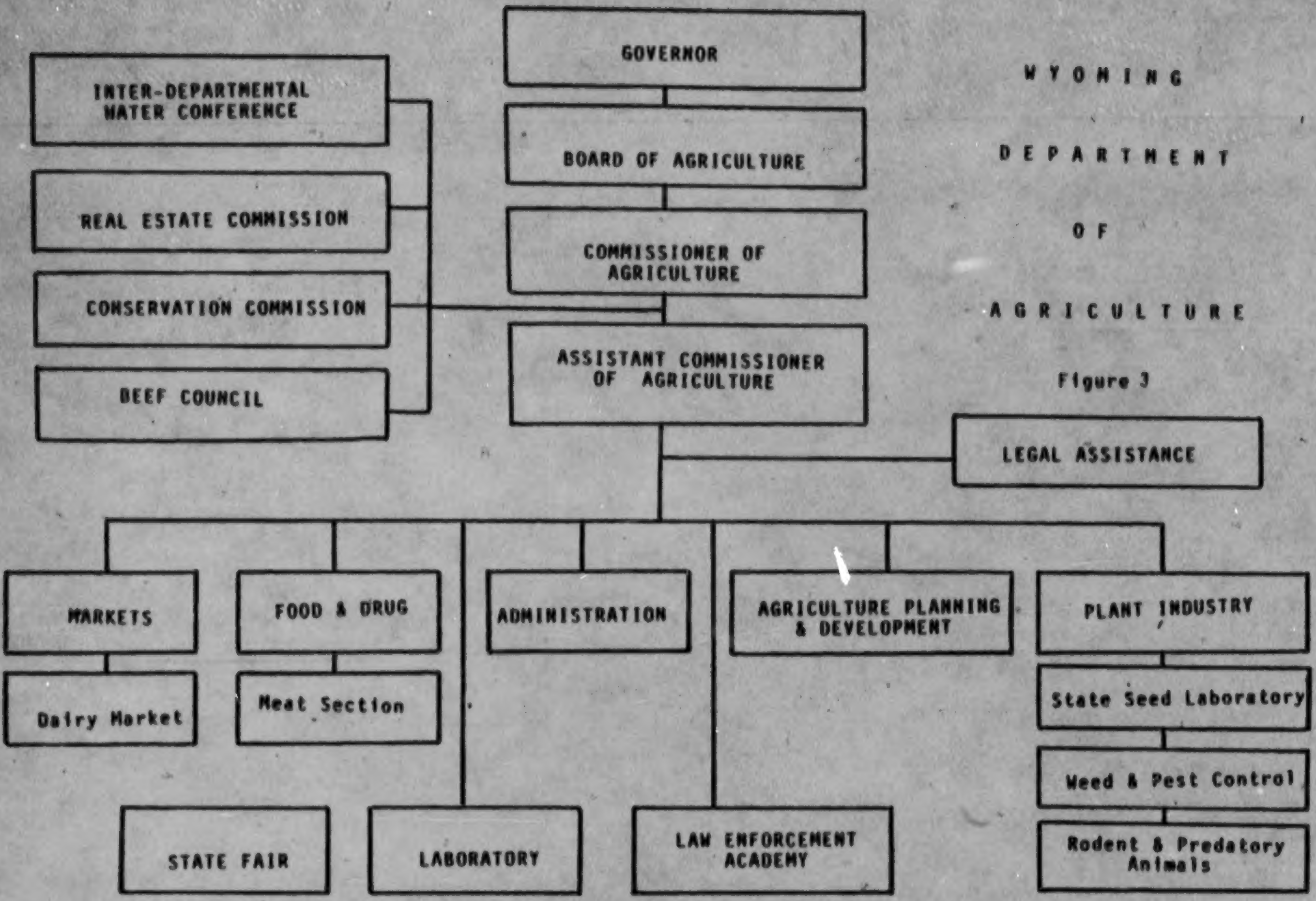
## STATE OF WYOMING
## DEPARTMENT OF AGRICULTURE

To encourage and to promote the development of agriculture, and to protect the health and general welfare of the citizens within the state, are now as in the past, the basic objectives of the Wyoming Department of Agriculture. The Department was created with a total of four employees in April , 1923. Today, 171 employees compose eight divisions. Under the guidance of the Commissioner, forty-one laws which specify the Department's duties and responsibilities are administered. The divisions are responsible for carrying out the laws and regulations as promulgated by the Wyoming legislature. Presently these divisions include: (1) Administration; (2) Food and Drug; (3) Markets; (4) Laboratories; (5) Plant Industry; (6) State Fair; (7) Real Estate; and (8) Agricultural Planning and Development.

The Department is currently exploring the possibility of redefining the responsibilities of the eight divisions into three major categories. The three new divisions would be: (1) Administration; (2) Regulatory; and (3) Consumer Services. This change would consolidate the laws into three classifications which would increase the efficient use of the Department's personnel and financial resources.

The Wyoming Department of Agriculture works in cooperation with five commissions and councils and several federal and state agencies. The following pages include an organizational chart of the Department, which illustrates the commissions and councils. The federal and state agencies are mentioned in "Pollution Control and Abatement Programs, Section III, Pesticides." The functions of the divisions within the Department are depicted in Figure 6.

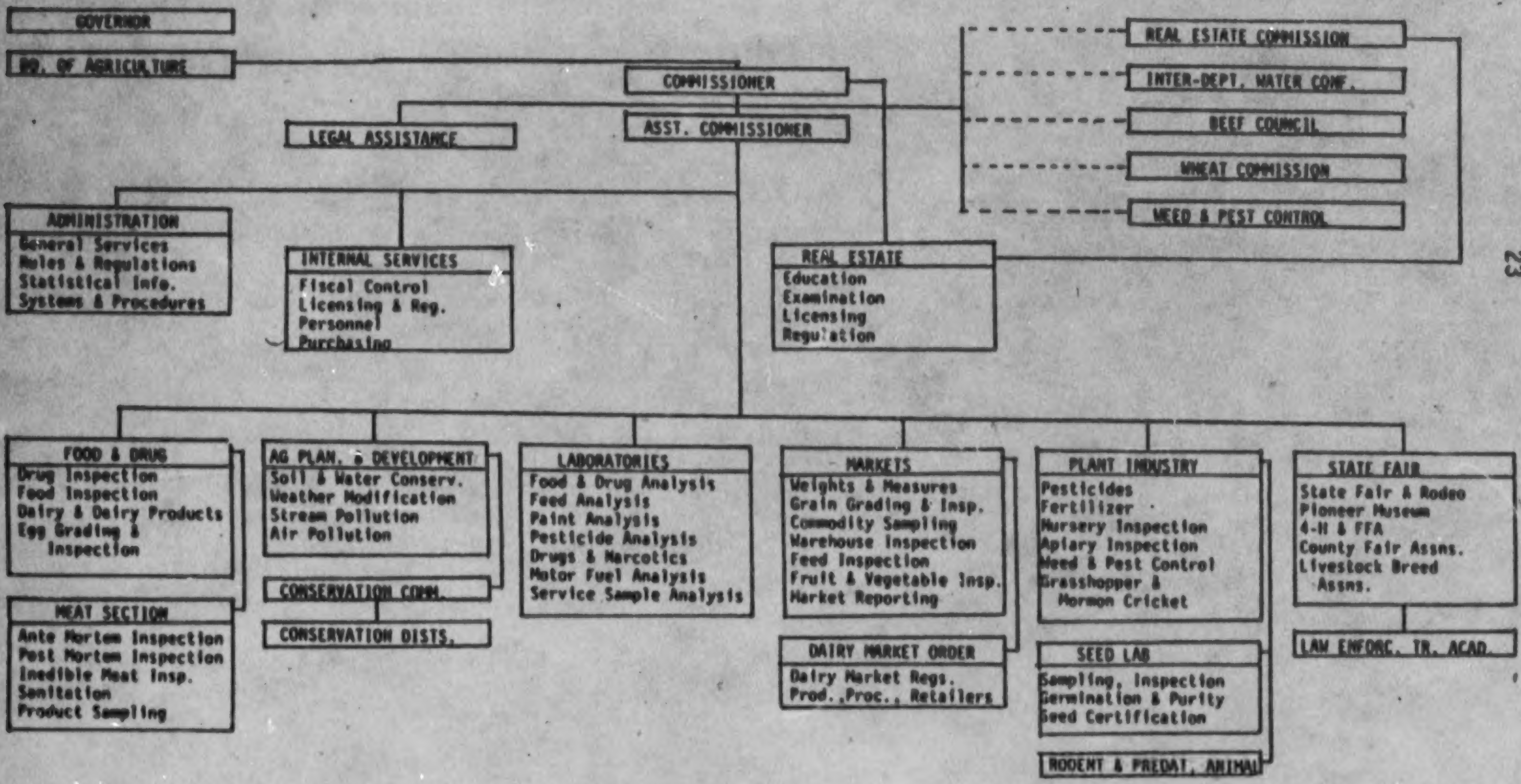
The Wyoming Board of Agriculture contributes to the agricultural community and the state by advising the Commissioner and the Department. Members of the Board of Agriculture are appointed by the Governor for a term of four years. Each member is actively engaged in agricultural pursuits and is selected (one each) from the five districts. No more than three of these members may be from the same political party.



WYOMING DEPARTMENT OF AGRICULTURE

Figure 3

Figure 4
WYOMING DEPARTMENT OF AGRICULTURE: functions of the divisions - 1976



SOURCE: Annual Report of the Department of Agriculture, June 30, 1976, page 4.

## STATE OF WYOMING

## DEPARTMENT OF HEALTH & SOCIAL SERVICES

In 1969 the Wyoming Department of Health & Social Services was created within the executive branch. The creation of this department amounted to a consolidation of the various departments of health, welfare and vocational rehabilitation. At the same time, three Advisory Councils were established with a total of five members.

The Department of Health & Social Services is composed of 614 (authorized) personnel allocated to four divisions. Personnel are distributed across the divisions in the follow manner:

| | |
|---|---|
| ° Administration Division | 38 |
| ° Vocational Rehabilitation Division | 75 |
| ° Public Assistance & Social Services Division | 283 |
| ° Health & Medical Services Division | 218 |
| TOTAL | 614 |

The Radiological Health Section is a part of the Division of Health & Medical Services. Another function this Division was Sanitary Engineering Services. This section consisted of 16 personnel who were relocated to the Department of Environmental Quality (DEQ) in July, 1973.

## STATE OF WYOMING

## DEPARTMENT OF HEALTH & SOCIAL SERVICES

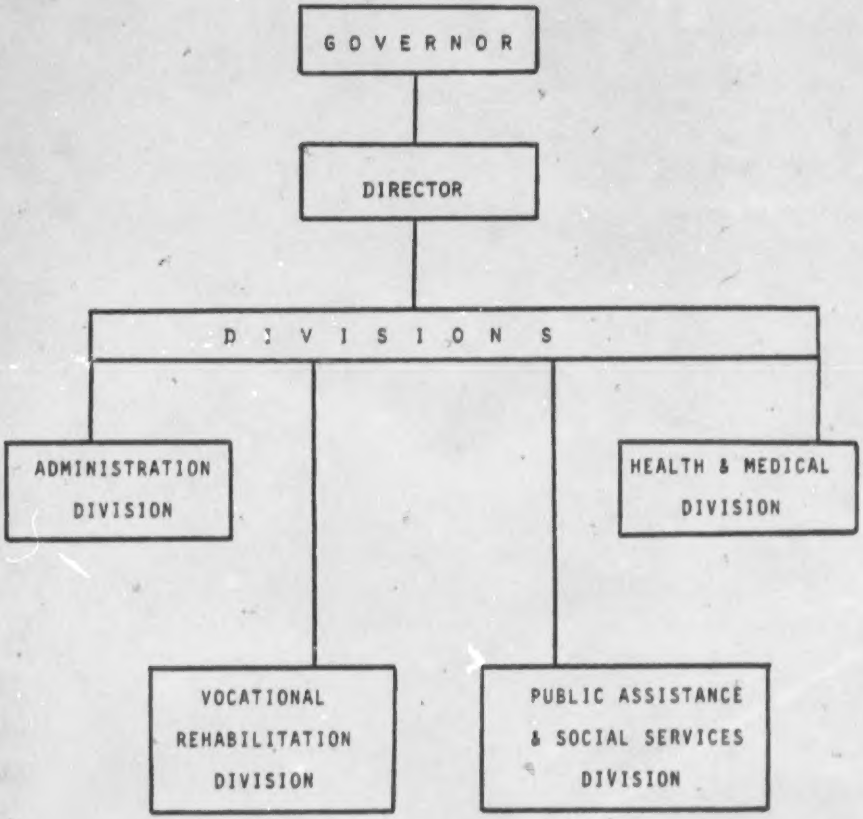
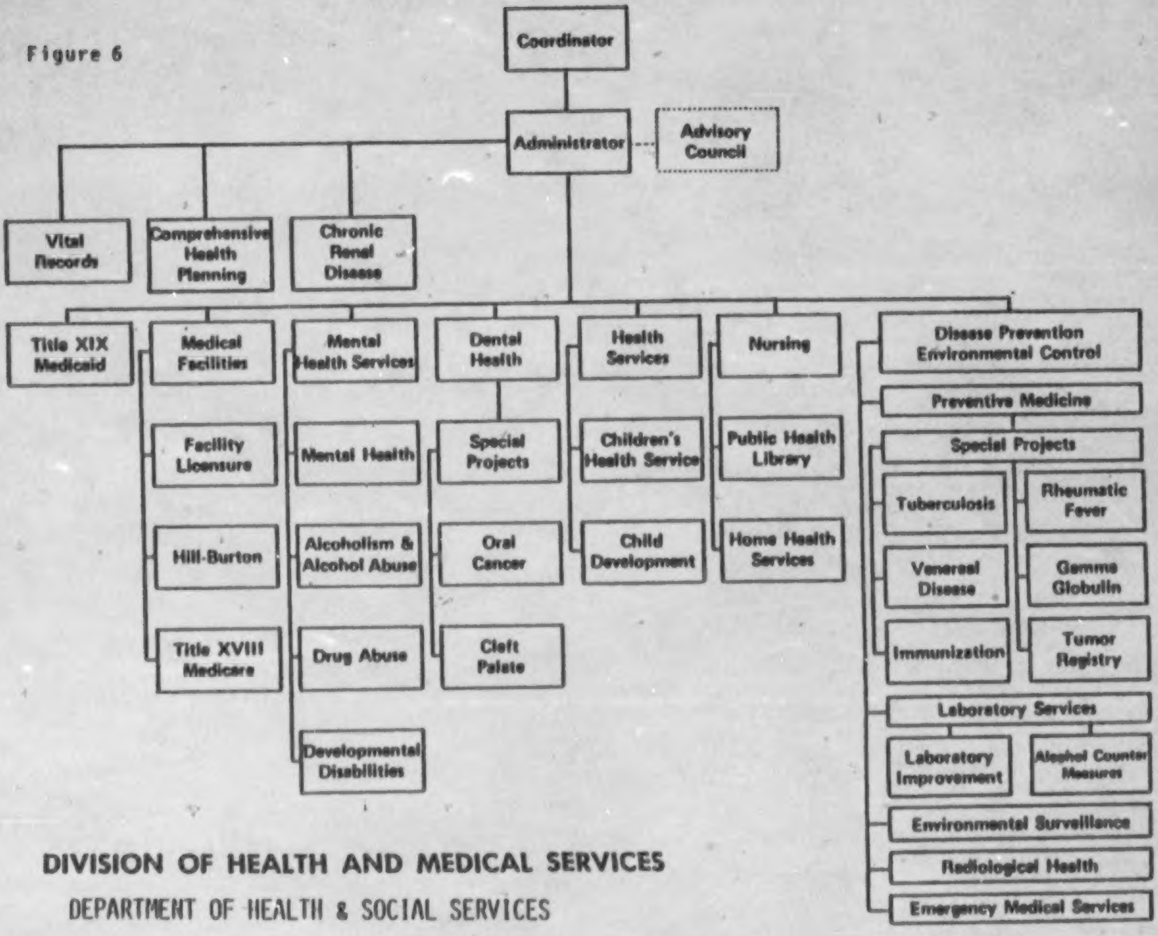

GOVERNOR
DIRECTOR
DIVISIONS
ADMINISTRATION DIVISION
HEALTH & MEDICAL DIVISION
VOCATIONAL REHABILITATION DIVISION
PUBLIC ASSISTANCE & SOCIAL SERVICES DIVISION

Figure 5

Figure 6



DIVISION OF HEALTH AND MEDICAL SERVICES

DEPARTMENT OF HEALTH & SOCIAL SERVICES

# Pollution Control and Abatement Programs

# I. AIR

## A. Introduction

Under the Wyoming Environmental Quality Act, 1973, (amended 1974 and 1975) authorization has been granted for the establishment of the Division of Air Quality in the Department of Environmental Quality (DEQ). Under the Wyoming Act in 1973, an advisory board was also created. The Air Quality Advisory Board is composed of five members who are appointed by the Governor. The members are representative of the composition of the state in the following manner: one member represents the agricultural community, one represents industry, one member is a political representative and the remaining two members represent the public interests. Although appointed by the Governor no more than three of the five members may be from the same political party.

The Air Quality Advisory Board meets four times annually and acts in an advisory capacity to the Environmental Quality Council (refer to previous section, "Wyoming Pollution Control and Abatement Agencies") through the Air Quality Division Administrator and the DEQ Director. Rules, regulations and standards are recommended to the Council.

Wyoming Air Quality is higher than the national standards , for the most part. However, there are two Air Quality Maintenance Areas (AQMA) in Wyoming as defined by the U.S. EPA Region VIII Administrator. The areas are the Sweetwater AQMA and the Powder River Basin AQMA. These two areas have been identified by the U.S. EPA as having the potential for failing to maintain ambient air quality standards; designations were for sulfur dioxide and particulates in the Sweetwater AQMA and for particulates and photochemical oxidants in the Powder River Basin AQMA.

The State Implementation Plan (SIP) needs revision for both attainment and maintenance of primary and secondary particulate standards in the Sweetwater AQMA, but is adequate to maintain standards through 1985 regarding sulfur dioxide. Without control of fugitive dust emissions from surface coal mining in the Powder River Basin AQMA there is a potential for exceeding secondary particulate standards in the next five to ten years.

### B. Workforce Profile

The DEQ Division of Air Quality has statutory authority regarding monitoring and surveillance and also has the responsibility for implementing standards. The Division recommends ambient air standards or emission control requirements, in order to prevent, abate, or control air pollution in Wyoming. These requirements (or standards) may be for a specific area or for the entire state as a whole. The consideration of contributing factors is a requisite to Division action. Among these factors are:

- the degree of injury to people, animals, wildlife and plant life;
- the economic and social evaluation of the source of pollution;
- the priority of the area of source location;
- the reasonableness of abating, controlling or eliminating the pollution source (with emphasis on economic and technical constraints).

In order to facilitate monitoring and surveillance of the air quality of the state, Wyoming is divided by the Division of Air Quality into five air quality division areas. The partition of the state into these air quality areas, and a Division organizational chart may be seen on the following pages. The staffing level of the DEQ Air Quality Division appears in the table below.

### TABLE I

### WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division
Current (1976) Staffing Level

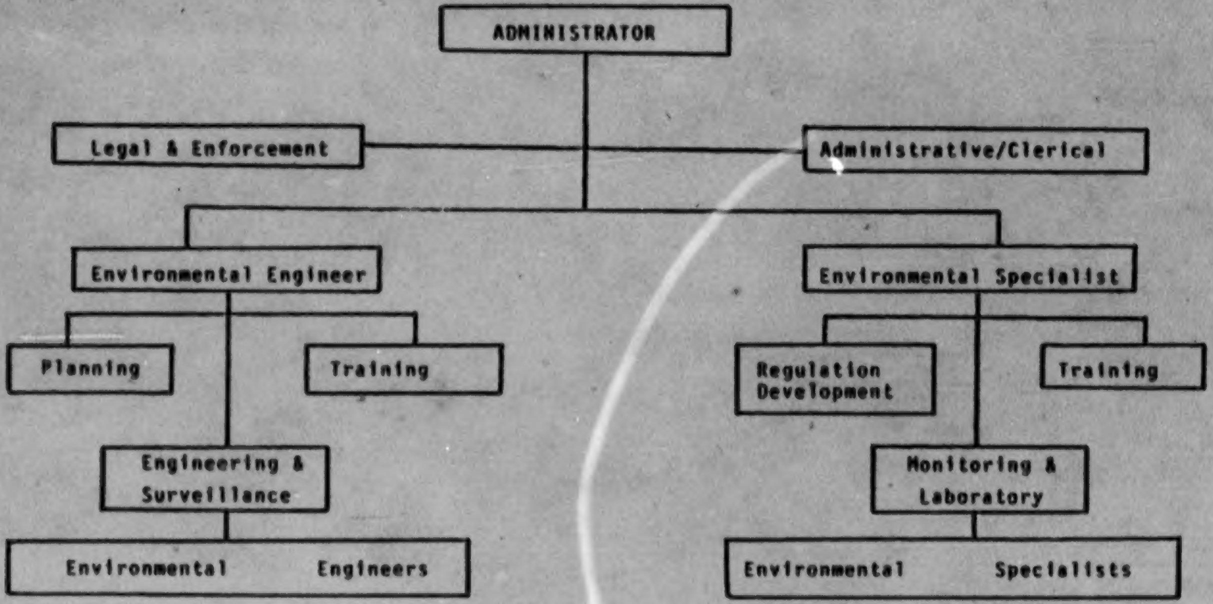
| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Air Quality Administrator | 1 | 0% |
| Environmental Engineer | 6 | 14% |
| Environmental Specialist | 4 | N/A |
| Secretarial | 3 | N/A |
| TOTAL | 14 | N/A |

Currently the Division consists of fourteen full-time employees. An Environmental Engineer is responsible for each of the five air quality areas delineated on the preceding map. Not illustrated on the above table is the part-time legal intern which is assigned, when available, to the Division.

A detailed description by occupation of the air pollution control and abatement personnel in the State of Wyoming other than the DEQ staff

## STATE OF WYOMING

Figure 7



DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

AIR QUALITY DIVISION

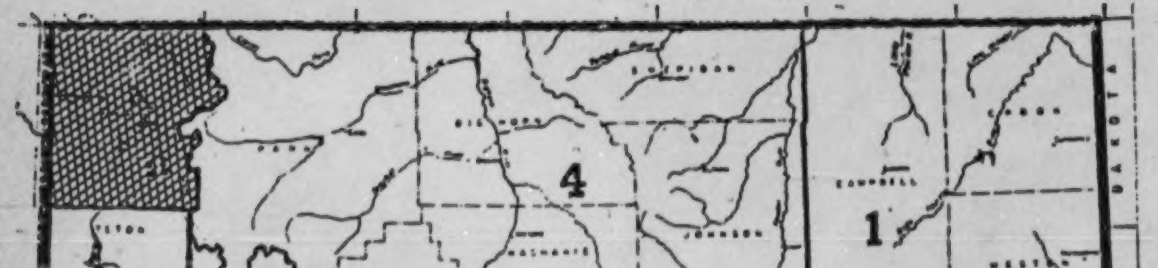
—3

STATE OF WYOMING

DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR QUALITY DIVISION AREAS

Figure 8



is not available presently. However, the Air Quality Division has estimated that there are approximately 200 persons presently employed in the air pollution control and abatement field across Wyoming, in the private as well as the public sector.

## C. Workforce Projections

Experts within the field of air pollution control and abatement find it exceedingly difficult to make projections regarding manpower requirements for Wyoming for the near future. The major reason for this reticence lies in the fact that Wyoming is an energy impacted state. As such, "boom and bust" symptoms have been and are presently characteristic of many areas of the state. With the continuation of coal development and the increase in population and energy related development, a 3% to 5% growth may be anticipated over the next three to five years in the state.

## D. Training and Certification

Training for the Air Quality Division involves informal on-the-job activities for new employees. There is no air training available in the state at the present time and the U.S. EPA courses offered by the Air Pollution Training Institute are extensively attended by Division personnel. Members of the staff are often sent out of the region to the location of a particular course, i.e., New York.

Smoke Readers are certified through several options. When a new employee joins the Division he/she is sent to the training courses in

Utah or Colorado, which are extensive and cover broad topics of air pollution control. All of the Air Quality Division staff are certified Smoke Readers. Certification must be renewed by attending a smoke reading school each six months. The Wyoming personnel are ordinarily sent to Fort George, Colorado where the Colorado Health Department conducts smoke readers schools. For the Wyoming staff to utilize the Fort George training and certification option, a total of four travel days per year is required. This option, therefore, is most often utilized by the Division personnel.

The following table details the training and certification activities of the Division during fiscal years 1976 and 1977.

### TABLE II

### DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division
Training
FY 1976 - FY 1977

| Sponsor | Length | Program | Number Trained | Certified |
|---|---|---|---|---|
| Colorado Health Department | 1-2 days | Smoke Readers School | 11 | 11 |
| (NOTE: Repeated three additional times with same persons) | | | | |
| EPA Air Training Institute | 4 1/2 days | Air Pollution Meteorology | 1 | N/A |
| EPA Air Training Institute | 4 days | Control of Particulate Emissions | 3 | N/A |

TABLE II

(continued)

| Sponsor | Length | Program | Number Trained | Number Certified |
|---|---|---|---|---|
| EPA Air Training Institute | 4 days | Control of Gaseous Emissions | 3 | N/A |
| EPA Air Training Institute | 3 1/2 days | Legal Aspects for Control Agency Decision Makers | 1 | N/A |
| EPA Air Training Institute | 4 days | Statistical Evaluation of of Air Pollution Data | 2 | N/A |
| EPA Air Training Institute | 5 days | Combustion Evaluation | 4 | N/A |
| EPA Air Training Institute | 4 days | Air Pollution Control Technology | 2 | N/A |
| EPA Air Training Institute | 4 days | Atmospheric Sampling | 3 | N/A |
| EPA Air Training Institute | 3 days | Air Pollution Field Enforcement | 2 | N/A |
| EPA Air Training Institute | 4 days | Source Sampling for Particulate Pollutants | 2 | N/A |
| EPA Air Training Institute | 3 days | Quality Assurance for Air Pollution Measurement Systems | 2 | N/A |
| EPA Air Training Institute | 3 days | Air Quality & Emissions Data Systems | 1 | N/A |

## E. Career Potential

Air pollution control career opportunities, to a limited degree, will be available at the degreed level. Industrial air pollution control equipment is exceedingly expensive and is not apt to be relegated to less than highly expert responsibility. Considerable engineering experience will generally be demanded by industry. In the future, the industrial sector is the area in which the majority of the air pollution control and abatement career opportunities will be found.

## F. Conclusion

In 1973, when the Department of Environmental Quality established the Air Quality Division, 200 emission sources were identified. Currently, the Division details the following: of the 77 facilities capable of emitting over 100 tons of pollutant each year, 73 are in compliance and four are in violation. The DEQ Division has expressed the expectation that these sources will be in compliance by July, 1977. Between September, 1975 and June 1976, a total of 422 investigations of compliance status were accomplished. Of the total, 417 were field investigations.

Efforts on the part of the State of Wyoming directed toward air quality began as early as 1967. The following table presents a synopsis of the legislative and regulatory achievements.

## TABLE III

## STATE OF WYOMING

### Legislative & Regulatory Activities Air Pollution Control & Abatement (synopsis)

| YEAR | ACTIVITY |
|---|---|
| 1967 | ° Wyoming Air Quality Act passed. |
| 1968 | ° Particulate standards adopted. |
| 1970 | ° Ambient air standards adopted for: sulfur dioxide, hydrocarbons, total oxidants, oxides of nitrogen and fluorides. |
| | ° Restrictions adopted on open burning. |
| | ° Odor standards passed based on scentometer readings. |
| | ° Emission standards for fuel burning passed. |
| | ° Relative opacity and Ringelman visual emissions adopted for: stacks, wood waste burners, and incinerators. |
| | ° Reporting procedure instituted: Wyoming Air Resources Council responses to citizen complaints. |
| 1973 | ° Wyoming Environmental Quality Act passed. |
| 1974 | ° Regulations updated pursuant to Environmental Quality Act. |
| | ° Permit system adopted. |
| | ° Nitrogen oxide emission standards adopted for fossil fuel burning equipment. |
| 1975 | ° Sulfur dioxide emission regulations adopted. |

The table which follows details the annual expenditure history in the state for air pollution control and abatement from fiscal year 1968.

## TABLE IV

## STATE OF WYOMING

Annual Expenditures
FY 1968 - FY 1975
Air Pollution Control & Abatement[1]

| Fiscal Year | State Expenditures | Federal Expenditures | Total |
|---|---|---|---|
| 1968 | 1,370 | 5,517 | 6,887 |
| 1969 | 1,370 | 23,500 | 24,870 |
| 1970 | 1,370 | 24,000 | 25,370 |
| 1971 | 14,230 | 32,607 | 46,837 |
| 1972 | 32,042 | 68,016 | 100,058 |
| 1973 | * | * | * |
| 1974 | 62,945 | 72,422 | 135,367 |
| 1975 | * | * | * |
| 1976 | 248,564 | 228,452 | 477,016 |

* figures unavailable

[1] in Dollars

SOURCE: Wyoming Department of Administration & Fiscal Control; and Department of Environmental Quality, Air Quality Division.

The table above demonstrates the state's increasing concern and commitment to the problems and solutions of air pollution control and abatement in Wyoming.

Air quality in Wyoming in most areas is of higher quality than the national standards. Major air pollution problems are not as prevalent in Wyoming as in some of the other states of the United States. Similar to other energy rich western states, the concerns expressed within the state are directed at protecting this exceptionally high quality air. However, the people of the state do not desire to impede development of the state. These two philosophies seem occasionally at odds. But every effort is being made to direct these two efforts to a common goal -

the enrichment of the people and the State of Wyoming. Second only to the protection and enhancement of the existing high air quality, is the intent on the part of the state to improve the air quality in those few areas which have the potential for future problems.

## II. NOISE

### A. Introduction

Wyoming has no noise legislation at the present time. Therefore, there is no state allocated responsibility for a noise pollution control and abatement program. Wyoming is a agricultural state, and as such does not have many of the population-related problems which are common to the more urbanized states.

The Department of Environmental Quality has stated that at present there is little need for a state program of noise control, as problems are not now prevalent enough to necessitate the establishment of one.

### B. Workforce Profile

At the state level there appears to be no personnel involved in noise control. Exact figures for personnel at the local level are not available at present. The local involvement appears to include enforcement personnel, for the most part. Therefore, no workforce estimates are available.

There are several local noise ordinances in the state. Cheyenne, Lander, Powell and Riverton presently have ordinances pertaining to vehicles. Casper currently is the only city with a noise ordinance pertaining to zoning although this second largest city in the state, with a population of 40,000, has no vehicular or nuisance ordinances. Nuisance ordinances are in effect in Cheyenne, Lander, Powell and Worland.

As may be seen in the following table, Cheyenne is alone in having regulations which include acoustical criteria. Ordinances which lack acoustical criteria are difficult to enforce as the regulations are nonquantitative.

### TABLE V
### STATE OF WYOMING
### Municipal Noise Ordinances
### (1976)

| COMMUNITY | ORDINANCE | | | | | | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aircraft | Building | Construction | Nuisance | Railroad | Vehicle | Rec./Vehicle | Zoning | a | b | |
| Casper | | | | | | | | b | 0 | 1 | 1 |
| Cheyenne | | | | a | | a | | | 2 | 0 | 2 |
| Lander | | | | b | | a | | | 1 | 1 | 2 |
| Powell | | | | b | | a | | | 1 | 1 | 2 |
| Riverton | | | | | | a | | | 1 | 0 | 1 |
| Worland | | | | b | | | | | 0 | 1 | 1 |
| TOTAL (State) a | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 5 | N/A | 5 |
| b | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | N/A | 4 | 4 |
| | 0 | 0 | 0 | 4 | 0 | 4 | 0 | 1 | 5 | 4 | 9 |

KEY: a = regulation includes accoustical criteria;
b = regulation does not include accoustical criteria.

SOURCE: Sound and Vibration, December 1976. Clifford R. Bragdon, Contributing Editor.

## C. Workforce Projections

Due to the fact that noise control has not developed as a distinct professional area, and due also to a lack of interest in the field, the workforce in Wyoming should experience minimal growth over the next few years.

## D. Training and Certification

Training and certification in the environmental area of noise pollution and control in Wyoming are non-existent at present. As programs are developed across the state, it is anticipated that course offerings will be available most likely at the University of Wyoming in Laramie and at Casper Community College in Casper.

## E. Career Potential

Career opportunities in the state will be limited during the next three to five years. As state and local programs begin to emerge, career opportunities will be more available. These occupations will mostly be representative of degreed engineering categories. Engineering with acoustical expertise will be in demand at the local level and perhaps in the energy related industries. New or distinct careers in noise are not expected to emerge in the state at least until the late 1980's.

## F. Conclusion

The extensive energy resource development currently ongoing in the state may create noise related problems within the coming years.

The citizens of a sparsely populated state, being used to a quiet environment, can be unaware of the impending noise problems related to increased transient populations, increased heavy traffic patterns and secondary mine and milling activities. In an effort to establish preventive rather than curative programs, the U.S. Environmental Protection Agency has funded several small energy-related noise projects in the region. Wyoming's more populated southern neighbor has currently undertaken such a project. The ramifications and ensuing results of this project will be of great interest to Wyoming as this energy-rich state begins to experience noise problems related to development.

While local railroad ordinances have been established in other Region VIII states such as Montana and Colorado, none have been enacted in Wyoming. Railroad ordinances will proliferate as coal mining and transportation continues throughout the state. The U.S. EPA has determined that coal trains will produce high levels of noise near tracks. If there are no "barrier" type structures near the tracks to lessen the noise, the levels can be high enough to interfere with outdoor activities for approximately five miles.

All forms of heavy transportation will increase in the state as a secondary effect of coal production. Only careful planning will protect this vast western country. Therefore, although minimal, workforce figures in the noise pollution control and abatement area will increase, especially in the late 1980's.

## III. PESTICIDES

### A. Introduction

The Wyoming Department of Agriculture has been designated as the agency with primary responsibility for all pesticide-related activities and programs in the state. The Department administers forty-one laws. The following impact the environmental area of pesticides: the Predator Animal Control Law; Wyoming Weed & Pest Control Act of 1973; Wyoming Environmental Pesticide Control Act of 1973; and the State Entomologist Law.

The Department of Agriculture maintains cooperative relationships with other federal and state agencies. The pesticide-related activities are listed below.

TABLE VI

STATE OF WYOMING

Cooperative Agency Agreements with
Wyoming Department of Agriculture
(1976)

| Agency | Activity |
|---|---|
| U. S. Department of Agriculture, Agricultural Marketing Service | State-federal grasshopper and Mormon Cricket Control Program |
| U.S. Department of Agriculture, Animal & Plant Health Inspection Service | Insect surveys |
| U.S. Department of Interior, Bureau of Sport Fisheries & Wildlife | Rodent and Predator Control |
| U.S. Environmental Protection Agency | Certification program for restricted use applicators |

## TABLE VI

(continued)

| Agency | Activity |
|---|---|
| Wyoming Game & Fish | Predator Control Program |
| Wyoming Highway Department | Noxious weed control on all primary and secondary rodents |
| Wyoming Aeronautics Commission | Regulation of pilots and aircraft for predator control |
| Wyoming State Land Commission | Forest pest control on state lands |
| County Predator Control Districts | Predator Control |
| County Weed and Pest Control Districts | Weed and pest control |
| County Agricultural Extension Service | Conduct pesticide training courses; provide pesticide manuals; assist in preparation of examinations |

The Wyoming Department of Agriculture is a leader in the area of pesticides within Region VIII. The State Pesticide Plan has been utilized extensively throughout the region as a prototype for other states attempting to establish regulations and guidelines pursuant to FIFRA. Departmental pesticides objectives include the development, implementation, and maintenance of a program that will comprehensively regulate the labeling, distribution, storage, transportation and disposal of pesticides. The dissemination of up-to-date information, and the granting of technical assistance to users regarding correct all around usage of pesticides are also Departmental pesticides objectives.

## B. Workforce Profile

The pesticides program is conducted by the Division of Plant Industry, with a staff which is variable according to the current needs. There are three pesticides experts within the Department: the Commissioner, the Assistant Commissioner, and a Pesticides Specialist. The following table details the present pesticides workforce in the Department.

TABLE VII

WYOMING DEPARTMENT OF AGRICULTURE

Pesticides Personnel**
Current (1976) Staffing Level

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Commissioner | 1 | 0% |
| Assistant Commissioner | 1 | 0% |
| Division Director, Plant Industry | 1 | 0% |
| Pesticides Coordinator | 1 | 0% |
| Agricultural Field Representatives | 3 | * |
| Secretarial | 1 | N/A |
| TOTAL | 8 | N/A |

* unavailable
** NOTE: Although the functional responsibility is with the Division of Plant Industry, the pesticides personnel are from across the Department.

Although the above table details eight pesticides personnel for the Department, not all of these positions are allocated full-time to pesticides. The following table defines the percentage of time allocated to pesticides by the above personnel.

## TABLE VIII

## WYOMING DEPARTMENT OF AGRICULTURE

### Pesticides Personnel
### Percentage of Time Allocated to Pesticides
### (1976)

| Position | % of time allocated to pesticides |
|---|---|
| Commissioner | 10% |
| Assistant Commissioner | 15% |
| Division Director, Plant Industry | 25% |
| Pesticides Coordinator | 90% |
| Agricultural Field Representative | 75% |
| Agricultural Field Representative | 25% |
| Agricultural Field Representative | 25% |
| Secretarial | N/A |

There are also thirty additional Agricultural Field Representatives who, if required, would receive additional training in order to equip them to carry out pesticides-related activities.

According to the Division, there are also six qualified persons available from across the Department to assist with pesticides responsibilities.

The Wyoming Agricultural Extension Service assists the Department of Agriculture with the Pesticides program throughout the state, as does the University of Wyoming.

The following table details current staff across the state allocated to pesticides activities. This table does not include applicators. However, the below mentioned personnel do not necessarily devote full-time efforts to these programs.

## TABLE IX

## STATE OF WYOMING

Pesticide Personnel
Current (1976) Staffing Level
(estimated)

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Pesticide Specialist[1] | 1 | * |
| Entomologist[1] | 1 | * |
| Weed Specialist[1] | 1 | * |
| Agricultural Engineer[1] | 1 | * |
| Horticulturist[1] | 1 | * |
| County Agent | 29 | * |
| Research Entomologist[2] | 5 | * |
| Weed Researcher[2] | 1 | * |
| Biochemist[2] | 2 | * |
| Crop Researcher[2] | 3 | * |
| Plant Physiologist[2] | 2 | * |
| Doctor Veterinary Medicine[2] | 1 | * |
| Irrigation Specialist[2] | 1 | * |
| Livestock Nutritionist[2] | 2 | * |
| Laboratory Personnel[3] | 1 | * |
| TOTAL | 52 | N/A |

* unavailable

[1] Agricultural Extension Service;

[2] University of Wyoming;

[3] Chemical & Bacteriological Laboratory.

The following laboratory personnel detailed above are represented as full-time equivalent. There are currently fourteen persons available in the Wyoming Chemical and Bacteriological Laboratory who devote approximately ten percent of their time to pesticides analysis and examination. During FY 1975, a total of 84 pesticide, herbicide, and residue samples were tested in the laboratory. During FY 1976, the number of samples tested declined to 40.

The Division of Plant Industry currently conducts the following weed and pest programs:

- State survey to determine population densities;
- Technical assistance re: Beet Leafhoppers;
- Grasshopper control;
- Weed control;
- Forest insect survey and control.

Approximately 397,504 acres of Wyoming lands are infested with noxious weeds which cause approximately $8.8 million loss of income to ranchers and farmers per year. Approximately $750,000 worth of chemicals were used on designated weeds and pests. This program strives to bring the designated pests and weeds to a control level or to an economic balance.

In order to protect the forests of Wyoming, the Forest Insect program component assists forestry personnel in abating loss due to forest diseases and insects.

The Insect Pest Survey program element in conjunction with Federal, State and County personnel, conducts surveys in order to identify increasing species or new pest infestations. This information is collected and assessed on a national level in Maryland. The Plant Industry Division also conducts surveys and retrieves information relative to grasshoppers, Mormon Crickets and Beet Leafhoppers.

The major program elements of the Division other than pesticide activities include: apiary; fertilizers; nursey stock; animal remedies (veterinary medicines); and seed laboratory.

The following table details the estimated number of pesticide applicators that will require certification according to the categories listed.

### TABLE X

### STATE OF WYOMING

Pesticide Personnel
Applicators
Current (1976) Staffing Level

| Position | | 1976 |
|---|---|---|
| Commercial Applicators: | | |
| Agricultural Pest | | 86 |
| Plant | | |
| weed | 20 | |
| insect | 20 | |
| disease | 16 | |
| Animal | 30 | |
| Forest Pest | | 10 |
| Ornamental & Turf | | 62 |
| Weed | 21 | |
| Insect | 21 | |
| Disease | 20 | |
| Seed Treatment | | 30 |
| Aquatic Pest | | 20 |
| Right-of-way Pest | | 50 |
| Industrial | | 60 |
| Public Health Pest | | 23 |
| Regulatory Pest | 10 | 75 |
| Predator Control | 65 | |
| Demonstration & Research | | 50 |
| Private Applicators: | | |
| Agricultural Pest | | 4,169 |
| Plant | | |
| Weed | 1000 | |
| Insect | 1000 | |
| Disease | 330 | |
| Animal | 1839 | |
| TOTAL | | 4,635 |

## C. Workforce Projections

The Department of Agriculture will require an increase in pesticides related personnel over the next five years. It is emphasized that these positions will probably be 40% new hires and 60% intra-departmental transfers who have been retrained for pesticide work.

TABLE XI

WYOMING DEPARTMENT OF AGRICULTURE

Pesticide Personnel
Workforce Projections
to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| Commissioner | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Assistant Commissioner | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Division Director, Plant Industry | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Pesticides Coordinator | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Agricultural Field Representative[1] | 1 | 1 | 2 | 2 | 3 | 4 | * | 37% |
| Secretarial | 1 | 1 | 2 | 2 | 2 | 2 | N/A | 20% |
| TOTAL | 6 | 6 | 8 | 8 | 9 | 10 | N/A | 11% |

* unavailable

[1] Equivalent

The above table illustrates an average per annum increase in staff of 11%. This is misleading in that this figure represents an increase of three full-time equivalent field personnel and an added pesticides secretary. The field personnel will not experience a 60% per annum average increase in actual Departmental numbers as probably two of the three will be intra-departmental transfers.

The following table details projected increases for non-applicator state-wide pesticides personnel.

TABLE XII

STATE OF WYOMING

Pesticide Personnel
Workforce Projections
to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| Pesticide Specialist[1] | 1 | 1 | 1 | 1 | 1 | 1 | * | 2% |
| Entomologist[1] | 1 | 1 | 1 | 1 | 1 | 1 | * | 2% |
| Weed Specialist[1] | 1 | 1 | 1 | 1 | 1 | 1 | * | 2% |
| Agricultural Engineer[1] | 1 | 1 | 1 | 1 | 1 | 1 | * | 0% |
| Horticulturist[1] | 1 | 1 | 1 | 1 | 1 | 1 | * | 0% |
| County Agent[1] | 29 | 29 | 29 | 29 | 29 | 29 | * | 0% |
| Research Entomologist[2] | 5 | 5 | 5 | 5 | 5 | 5 | * | 0% |
| Weed Researcher[2] | 1 | 1 | 1 | 1 | 1 | 1 | * | 0% |
| Biochemist[2] | 2 | 2 | 2 | 2 | 3 | 3 | * | 10% |
| Crop Researcher[2] | 3 | 3 | 3 | 3 | 3 | 3 | * | 0% |
| Plant Physiologist[2] | 2 | 2 | 2 | 2 | 2 | 3 | * | 10% |
| Doctor Veterinary Medicine[2] | 1 | 1 | 1 | 1 | 1 | 1 | * | 0% |
| Irrigation Specialist[2] | 1 | 1 | 1 | 2 | 2 | 1 | * | 0% |
| Livestock Nutritionist[2] | 2 | 2 | 2 | 2 | 2 | 2 | * | 0% |
| Laboratory Personnel[3] | 1 | 1 | 2 | 2 | 2 | 2 | * | 20% |
| TOTAL | 52 | 52 | 53 | 54 | 54 | 54 | * | 2% |

* unavailable

[1] Agricultural Extension Service;

[2] University of Wyoming;

[3] Chemical & Bacteriological Laboratory.

The following table illustrates the workforce requirements to 1982 for certified applicators both commercial and private.

## TABLE XIII

## STATE OF WYOMING

### Pesticide Personnel Certified Applicators Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum increase (average) |
|---|---|---|---|---|---|---|---|
| Commercial Applicator: | | | | | | | |
| Agricultural Pest | 86 | 87 | 88 | 89 | 90 | 91 | 1% |
| Forest Pest | 10 | 10 | 10 | 10 | 10 | 11 | 1% |
| Ornamental & Turf | 61 | 61 | 61 | 61 | 61 | 61 | 0% |
| Seed Treatment | 30 | 30 | 30 | 30 | 30 | 30 | 0% |
| Aquatic Pest | 20 | 20 | 20 | 20 | 20 | 20 | 0% |
| Right-of-way Pest | 50 | 51 | 52 | 53 | 54 | 55 | 2% |
| Industrial | 60 | 60 | 61 | 61 | 62 | 62 | 1% |
| Public Health Pest | 23 | 23 | 23 | 24 | 24 | 24 | 1% |
| Regulatory Pest | 10 | 10 | 10 | 10 | 10 | 11 | 2% |
| Predator Control | 65 | 66 | 67 | 68 | 69 | 70 | 2% |
| Demonstration & Research | 50 | 50 | 51 | 51 | 52 | 52 | 1% |
| Private Applicators | 4169 | 4135 | 4100 | 4066 | 4033 | 4000 | -1% |
| TOTAL | 4635 | 4604 | 4574 | 4544 | 4516 | 4488 | -.6% |

The private applicators are ranchers and farmers. Currently (1976), there are 8,000 farms in Wyoming. (This represents a decrease of 1,100 farms from 1967; however, the total number of acres remains about the same.) Of the 8,000 potentially certifiable farmers, the Department has estimated that 4,635 (approximately 50%) will become certified in order to utilize restricted use pesticides. Should the number of farms and farmers decline at the same percentage per year over the next five years, the number of private applicators would decrease to approximately 4,000. The decline in private applicators would offset the minimal increases in commercial applicators for an average per annum .6% decline.

## D. Training and Certification

Training for the private applicator will be of three varieties. The private applicator may be trained and subsequently certified:

- General certification;
- Crop specific/commodity site certification;
- Single product certification.

Testing is by written exam or by oral examination if the applicant cannot read. Training will be conducted by the University of Wyoming and the Agricultural Extension Service.

Training for commercial applicators for the most part was accomplished by means of pesticides short courses conducted by Agricultural Extension Service personnel in conjunction with the University of Wyoming. The following Community Colleges cooperated in the presentation of various pesticide short courses: Casper, Torrington, Sheridan, Powell, Riverton and Rock Springs.

The following table illustrates the present status of the commercial applicators regarding training, testing, and certification.

## TABLE XIV

## STATE OF WYOMING

### Summary of Commercial Pesticide Applicator Examinations & Certifications (1976)

| Category | Number of Persons Tested | Number of Tests Taken | Number of Tests Passed | Number of Persons Certified |
|---|---|---|---|---|
| General | 421 | 421 | 417 | 417 |
| Agricultural Pest: Plant: | | | | |
| Weed | | 182 | 165 | |
| Insect | | 163 | 150 | |
| Disease | | 120 | 119 | |
| Animal | | 92 | 84 | |
| Forest Pest | | 34 | 32 | |
| Ornamental | | | | |
| Weed | | 96 | 80 | |
| Insect | | 86 | 49 | |
| Disease | | 69 | 68 | |
| Seed Treatment | | 33 | 32 | |
| Aquatic Pest | | 75 | 70 | |
| Right-of-way Pest | | 86 | 81 | |
| Industrial | | 64 | 48 | |
| Public Health | | 31 | 29 | |
| Regulatory | | 60 | 55 | |
| Predator Control | | 123 | 59 | |
| Demonstration | | 97 | 93 | |
| TOTAL | 421 | 1,832 | 1,598 | 417 |

Less than 50% of the applicants taking the Predator Control category exam were successful. As stated in the Wyoming Applicator Certification Rules and Regulations, "Predicide use requires peculiar ability beyond academic understanding, ability, that relates to integrated knowledge of local species, depredation patterns of predations on livestock..."

Predator Control Agents in Wyoming are required to have these extra knowledges and skills.

The Certification is valid for one year and commercial applicators must take a refresher course at least once every three years.

## E. Career Potential

Although degreed personnel will be required in administrative positions, there is no evidence to forecast an increase in the number of pesticides firms in the state. The number of certified, non-degreed commercial personnel will experience minimal growth. This will, in part, be due to increased efficiency and applicators changing firms rather than leaving the field.

## F. Conclusion

Wyoming's certification of applicators program is an example of efficient utilization of resources. The state has received EPA approval of the State Pesticide Plan contingent upon issuance of regulations. Wyoming has led the western regions in the area of pesticides activities. The State Plan was an example to other states while attempting to develop their plans.

As in other western and agriculturally based states, Wyoming has experienced increasing difficulties in the area of predator control during recent years. A major effort was launched on behalf of the department to alleviate predations on livestock, especially sheep. Wyoming is the second largest sheep producing state in the country and even the determined efforts on the part of the Department have not curtailed the decline in the sheep population. Although weather and unknown causes are contributors to loss, a large percentage of total loss causes are attributable to predators, specifically coyotes. The Department, however, has caused predator losses to decline during the last year, although statewide predator control personnel have not substantially increased.

Career opportunities, as stated above will be minimal across the state in pesticides. Research, regarding predators, pesticide surplus disposal and other agricultural/pesticide problems, is needed. But funding will remain difficult through state and federal sources. Continued efficiency of program direction will be required as an abundance of manpower and dollars is not anticipated over the next few years.

## IV. POTABLE WATER

### A. Introduction

Wyoming is a large and sparsely inhabited state. Because of these factors the water problems which are prevalent in the state are less in number and more widely distributed than smaller, more densely populated states.

As in most western agricultural states, water is a most valued resource in Wyoming. The state has stepped into an age of great mineral development which carries with it the critical necessity of responsible water usage and extensive planning for the future. At present there are 3.8 million acre feet of water unused and allotted to the state's future requirements.

There are several agencies which presently have jurisdiction over water projects in the state. Listed in the table below are the activities and the agencies which work in cooperation with the designated state lead agency, the Department of Environmental Quality (DEQ).

TABLE XV

STATE OF WYOMING

Agencies and Activities
Water - 1976

| AGENCY | ACTIVITY |
|---|---|
| U.S. Department of Interior, Geological Survey | Monitoring of water quality |
| Wyoming Department of Agriculture, Interdepartmental Water Conference | Technical assistance in state water development. |

TABLE XV

(continued)

| AGENCY | ACTIVITY |
|---|---|
| Wyoming State Engineer | Assists in planning and development of water resources |
| Wyoming Department of Agricultural, State Chemical and Bacteriological Laboratory | Analysis of water samples. |

The Wyoming Environmental Quality Act of 1973, legislatively allocated the responsibility for drinking water in the state to the Department of Environmental Quality (DEQ), the Water Quality Division. The Water Quality Administrator recommends to the Department Director, rules, standards, regulations and permit systems relative to drinking water.

Acting in an advisory capacity to the Division and to the Department Director is a five member Water Quality Advisory Board. The board is representative of industry, agriculture and the political and private sectors. The Governor appoints the Board and no more than three of the five members may be from the same political party.

Currently (1976) there are 159 water supply and/or distribution facilities in Wyoming. The following table details these facilities.

## TABLE XVI

## STATE OF WYOMING

### Water Facilities - 1976
### Illustrating Source, Treatment & Classification

| SOURCE/TREATMENT | CLASSIFICATION | | | | | TOTAL |
|---|---|---|---|---|---|---|
| | A | B | C | D | E* | |
| Wells | 0 | 0 | 0 | 4 | 1 | 5 |
| Wells, No Treatment | 0 | 0 | 3 | 28 | 18 | 49 |
| Wells & Spring, No Treatment | 0 | 0 | 0 | 1 | 0 | 1 |
| Wells, Chlorination | 0 | 0 | 5 | 16 | 0 | 21 |
| Wells, Individual $Cl_2$ | 0 | 0 | 0 | 1 | 1 | 2 |
| Wells, Electrodialysis | 1 | 0 | 0 | 0 | 0 | 1 |
| Wells & Surface, Chemical & Filtering | 2 | 0 | 0 | 0 | 0 | 2 |
| Surface, Chlorination | 0 | 1 | 4 | 14 | 0 | 19 |
| Surface, Chlorination & Mechanical Pump | 0 | 0 | 1 | 0 | 0 | 1 |
| Surface, Chlorination & Pump Station | 0 | 0 | 1 | 0 | 0 | 1 |
| Surface, Chemical & Filtration | 7 | 2 | 1 | 0 | 0 | 10 |
| Surface, Filtration & Chlorination | 0 | 0 | 3 | 0 | 0 | 3 |
| Spring, No Treatment | 0 | 0 | 0 | 2 | 0 | 2 |
| Spring, Chlorination | 0 | 0 | 0 | 3 | 1 | 4 |
| River, Chemical & Filtration | 0 | 0 | 1 | 0 | 0 | 1 |
| Creek, Chlorination | 0 | 0 | 1 | 0 | 0 | 1 |
| Supplied by Town | 0 | 0 | 0 | 0 | 1 | 1 |
| Not Identified | 0 | 1 | 0 | 18 | 16 | 35 |
| TOTAL | 10 | 4 | 20 | 87 | 38 | 159 |

* unclassified.

## B. Workforce Profile

Within the Water Quality Division of the Wyoming DEQ there currently is no clear cut distinction of personnel between the potable water and the waste water sections. However, the approximation of the current potable water staff appears below.

TABLE XVII

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Quality Division
Potable Water Personnel
Current (1976) Staffing Level

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Water Quality Administrator | 1 | 45% |
| Environmental Engineer | 4 | 0% |
| Environment Engineer (Supervisory & Assistant) | 2 | 50% |
| State Training Officer | 1 | 0% |
| Secretarial | 1 | N/A |
| TOTAL | 9 | N/A |

The State Training Officer, as well as the Water Quality Administrator, allocate time (approximately 55%) to the waste water area. One public relations professional is assigned to the Division as time allows. The Environmental Engineers listed above are assigned to the water quality division areas shown on the following page. An organizational chart is found following this area map. It is noted that the Environmental Engineers listed above also conduct waste water activities within their designated areas.

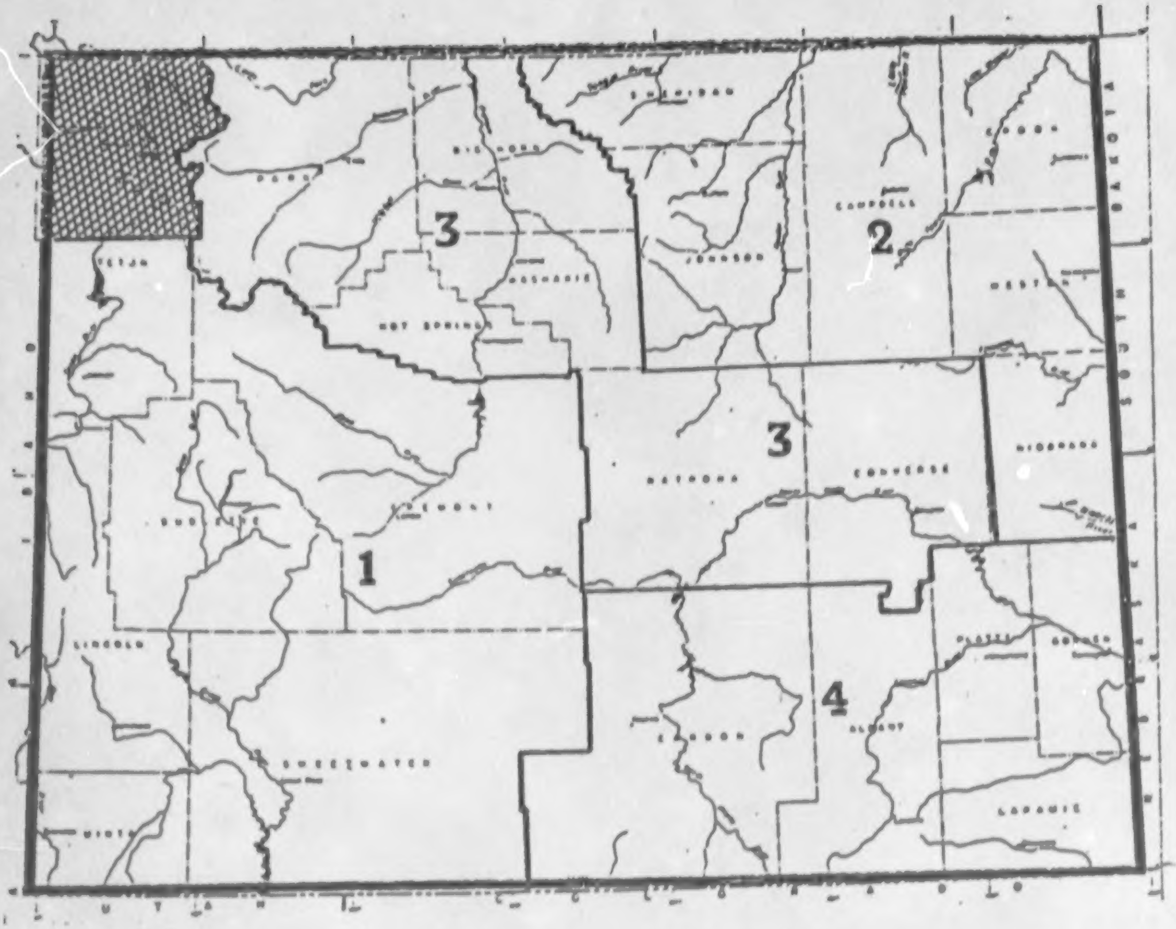
The State of Wyoming has indicated its intention to adopt primary enforcement responsibility in accordance with the Environmental Quality

# STATE OF WYOMING

# DEPARTMENT OF ENVIRONMENTAL QUALITY

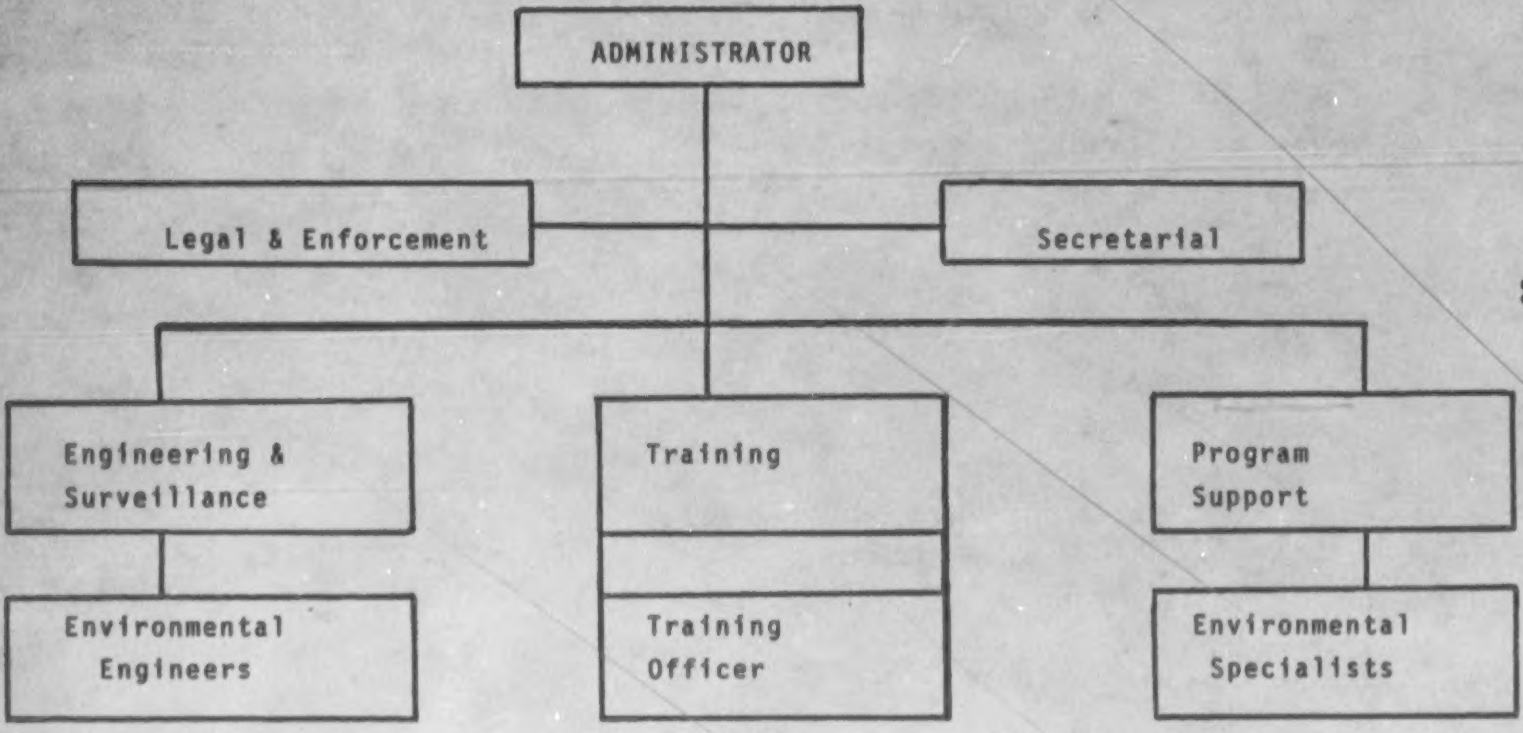
## WATER QUALITY DIVISION AREAS

Figure 9



## STATE OF WYOMING

Figure 10



DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

WATER QUALITY DIVISION: Potable Water & Waste Water

Act of 1973. Legal definitions and changes in the law are required for this. These changes cannot be effected however, until the biennial meeting of the State Legislature in January, 1977.

Pursuant to the state's declaration of intention to assume primacy, the Division has been conducting surveys of municipal water supplies and water districts. Presently, it is understood that the Division is endeavoring to assess community systems, make determinations regarding supplies with known serious defects, and identify and assess non-community water systems.

Within the state grant applications, Wyoming has indicated the ability to meet vital criteria necessary to assume primary enforcement responsibility. Evidence of this ability is still being gathered.

Laboratory facilities are presently available in the state in sufficient numbers and with the capabilities of analytical testing of all chemical and bacteriological contaminants. The laboratory facilities have been identified as follows (locations are in parentheses):

- Bacteriological Laboratories:
    - Wyoming Department of Health & Social Services (Cheyenne)
    - Northwest Analytical Labs (Powell)
    - Casper-Natrona County Health Department (Casper)
    - Municipal Water Treatment Plant, Casper Board of Public Utilities (Casper)
    - City-County Health Department (Cheyenne)
    - Department of Environmental Quality Lab (Mobile)
    - State Chemist, Department of Agriculture (Laramie).
- Chemical Laboratories:
    - State Chemist, Department of Agriculture (Laramie)
    - Core Laboratories (Casper)
    - Northwest Analytical Labs (Powell)
    - Chemical & Geological Labs (Casper)
    - Department of Environmental Quality Lab (Mobile).

The U.S. Department of Interior, Geological Survey investigates and retrieves water samples which are sent to the State Chemist (Department of Agriculture, Chemical & Bacteriological Laboratory). In fiscal year 1976, 800 surface and underground samples were submitted by the U.S.G.S. to the lab for analysis. The Laboratory also tested 2,298 samples labeled "household water and irrigation" during the same period.

The Wyoming Department of Agriculture (Interdepartmental Water Conference) seeks to gain greater cooperation statewide for water administration, development and utilization.

The State Engineer, the DEQ and the Department of Agriculture cooperate in planning development of the state's water resources.

The number of personnel which makes up the workforce in potable water across the state has not been determined with the exception of the water treatment and supply operators. This segment of the workforce is detailed in the following table.

TABLE XVIII

STATE OF WYOMING

Water Treatment & Water Distribution System Operators
Current (1976) Staffing Level

| Class | 1976 | %/annum turnover (average) |
|---|---|---|
| A | 4 | 1% |
| B | 5 | 15% |
| C | 60* | 40% |
| D | 90* | 45% |
| TOTAL | 159 | 25.5% |

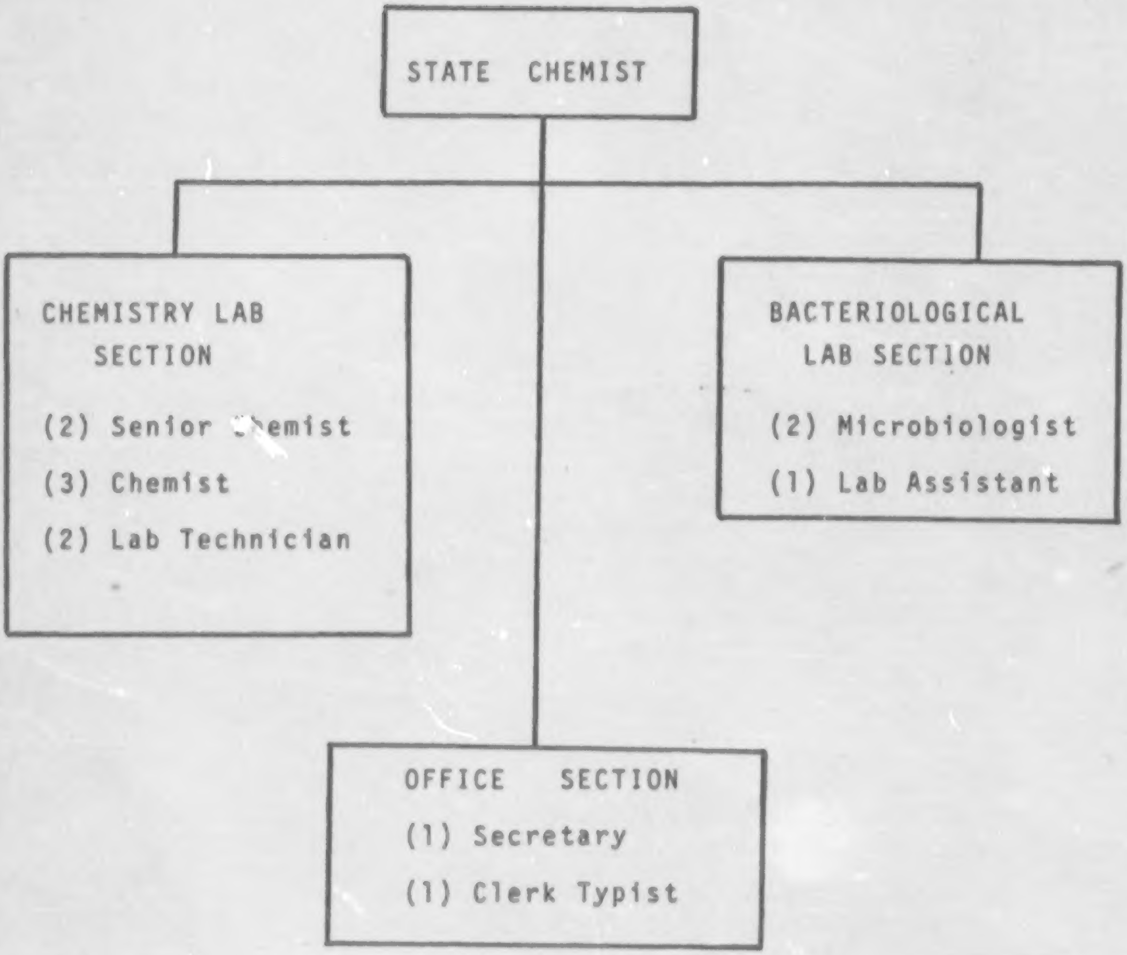
* estimated

# STATE OF WYOMING

## DEPARTMENT OF AGRICULTURE

## DIVISION OF LABORATORIES

Figure 11



It is noted that Class A is the highest certification category. The turnover rate is not as high as neighboring Colorado because the Wyoming operator salaries are somewhat higher. The mining industry offers substantially higher salaries which tend to increase the turnover rate of operators.

## C. Workforce Projections

The Water Quality Division along with the other DEQ Divisions, has experienced a substantial growth since the Department's creation in 1973. The potable water area of the Division will have vast increases in program responsibility should the state assume primacy. There is little evidence, however, to support increases in staff at this time without a rather massive reorganization of the Division.

The number of operators statewide will increase over the next five years. The table below estimates workforce requirements for operators to 1982.

TABLE XIX

STATE OF WYOMING

Water Treatment & Water Distribution System Operators
Workforce Projections to 1982 (est.)

| Class | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| A | 4 | 4 | 5 | 6 | 7 | 8 | 1% | 10% |
| B | 5 | 5 | 6 | 6 | 7 | 7 | 15% | 5% |
| C | 60 | 69 | 79 | 91 | 104 | 120 | 40% | 15% |
| D | 90 | 104 | 120 | 138 | 158 | 181 | 45% | 15% |
| TOTAL | 159 | 182 | 210 | 241 | 276 | 316 | 25.5% | 15% |

Laboratory personnel across the state should experience a two percent per annum increase to 1982.

D. Training and Certification

The training section of the Water Quality Divison of the DEQ is the sole responsibility of the State Training Officer. Prior to 1975, when the Training Officer joined the Division, very little operator training was available. All records and information relative to training during that time have been discarded. The State Training Officer works independently at Operations and Maintenance as well as developing curriculum for operator training, and is housed in Casper. The excessive traveling requirements would make Cheyenne, which is located in the south, an exceedingly difficult base of operations for any field Training Officer who is required to cover the entire state.

Certification within Wyoming became mandatory in 1975, although as early as 1973, the Wyoming law provided for certification. (Section 35-502.19 of the Environmental Quality Act.) The person responsible for the plant must be certified at the same level as the plant has been classified. A "B" plant, in other words, would require an operator classified as "B" or above. There are certain educational and experiential requirements for certification.

The State Training Officer is responsible for review of all applicant's information and determines eligibility for examination and certification. Certifications are renewable annually.

Although the State Training Officer is responsible for the training of water operators, present lack of funds for this area curtails extensive activities and inhibits, to some extent, increased water training. The training of these operators is accomplished often in conjunction with waste water operators. In Wyoming, the Training Officer has developed curriculum in the form of video tapes and booklets, with minimal financial, staff and psychological support. The training area is perceived by some as the strongest element of the present Water Quality Division.

TABLE XX

STATE OF WYOMING

Water Training
(1976)

| Sponsor | Date | Length | Program | Number Trained | Number Certified |
|---|---|---|---|---|---|
| DEQ Training Officer | 10/75 | 1 week | Operators School | 110 | 26 |
| DEQ Training Officer | 4/76 | 1 week | Operators School | 91 | 16 |
| DEQ Training Officer | 10/76 | 1 week | Operators School | 37 | 15 |

### E. Career Potential

New jobs will be created in this field as a consequence of advancing technology, and more stringent federal and state legislation. Opportunities will continue to be available at the operator level, but a definite increase in educational training with increased specialized expertise will be the trend of the future.

## F. Conclusion

It has been estimated that 72% of Wyoming's population is currently served by public water supplies. 97% of those supplies meet bacteriological standards. One-third of these supplies utilize surface water while two-thirds are dependent upon ground water. The U.S. Environmental Protection Agency Lake and Reservoir Assessement, 1976, by Cooger, Payne and Sprenger, identifies four reservoirs in the state which serve as drinking water sources for Casper, Cody and Kemmerer. These reservoirs are: Pathfinder, Alcova, Buffalo Bill and Hams Fork.

With minor exceptions, an overall assessment of Wyoming water quality indicates that the waters of the state are sustaining fish and wildlife. As with other environmental areas the majority of the problems associated with potable water are a direct or an indirect result of energy resource development. For example, the population of Gillette tripled in five years; drinking water supplies became quite scarce. Any rapid and large increase in population requires extensive planning. The "boom" conditions prevalent in southwest Wyoming were not properly anticipated. Parts of southeast Wyoming are also designated as an energy impact area. The Powder River Basin in the northeast part of the state will experience industrialization based upon the utilization of coal. Environmental considerations must be an integral part of this required planning.

Continued utilization of the services of the U.S. Geological Survey and the Wyoming Department of Agriculture are critical to continued protection of the state's drinking water. Increased participation on behalf of state and federal agencies would perhaps lend needed strength to the Division of Water Quality. Increased workforce personnel in the drinking water area are necessary to Wyoming's desire to assume primary enforcement responsibility. A more in-depth study is needed in order to more accurately determine staffing and program requirements.

## V. RADIATION

### A. Introduction

The major responsibility for radiological health has been delegated to the Department of Health & Social Services, Division of Health and Medical Services, Radiological Health Services Section. The primary responsibility of this Section is to reduce and/or prevent unnecessary radiation exposures to the people of Wyoming.

Proposed legislation is intended to give authority to the Section to adopt rules and regulations for the control of radiation. This legislation would also allow the Section to negotiate with the U.S. Nuclear Regulatory Commission (NRC) in an effort to become an Agreement State, thereby assuming the responsibility of licensing users of radioactive materials in Wyoming.

### B. Workforce Profile

In accordance with Article 3, Chpater 35, Section 201-203, the Radiological Health Services (RHS) Section registers users of radioactive isotopes and associated materials which are extensively utilized by industry throughout the state. The majority of these users, while currently conducting their activities within Wyoming, originate from outside the state. The above referenced law was adopted in 1953 and was intended to require uranium producers to apply for registration with the Department of Health & Social Services. For identification of those producers, this law is deemed satisfactory by the RHS Section. However, the usage of radioactive materials in industry and medicine has increased and continues to increase, and this law offers less than effective means of accounting for quantities and users in Wyoming today.

The following table details those users of radioactive materials which are currently registered with the state.

TABLE XXI

STATE OF WYOMING

Users of Radioactive Materials
Current (1976) Registration

| User | FY 1976 Registered | Total Registered |
|---|---|---|
| Radiography | 15 | 34 |
| Medical | 1 | 12 |
| Educational | 1 | 3 |
| Service | 5 | 11 |
| Industrial | 9 | 46 |
| Distributor | 5 | 18 |
| Well Logging | 10 | 28 |
| Veterinary | 0 | 1 |
| TOTAL | 46 | 153 |

SOURCE: Annual Report of Radiological Health Activities, FY 1976.

The Radiological Health Service performs inspections in conjunction with the Nuclear Regulatory Commission status. The primary responsibility for emergency response to radiation incidents has been allocated to the RHS Section.

The Radiological Health Services Section is composed of two full-time staff members, as seen in the following table. The X-Ray Technician allocates approximately forty percent of the time to secretarial responsibilities.

## STATE OF WYOMING

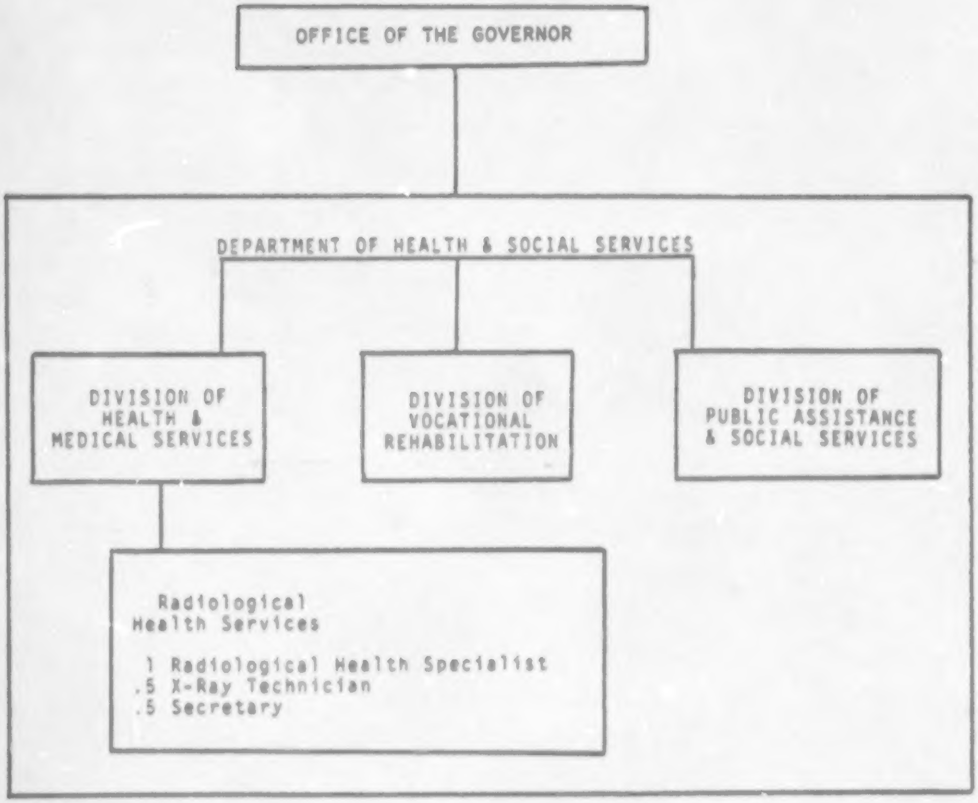

OFFICE OF THE GOVERNOR
DEPARTMENT OF HEALTH & SOCIAL SERVICES
DIVISION OF HEALTH & MEDICAL SERVICES
DIVISION OF VOCATIONAL REHABILITATION
DIVISION OF PUBLIC ASSISTANCE & SOCIAL SERVICES
Radiological Health Services
1 Radiological Health Specialist
.5 X-Ray Technician
.5 Secretary

Figure 12 Department of Health & Social Services, Division of Health & Medical Services, Radiological Health Services.

## TABLE XXII

## STATE OF WYOMING

## X-Ray Registrants & Inspections (1976)

| X-Ray User | Registered | Inspected Number | Inspected Tubes | X-Ray Tubes |
|---|---|---|---|---|
| Dental | 100 | 51 | 117 | 170 |
| Chiropractic | 18 | * | * | 18 |
| Hospital | 28 | 29 | 145 | 147 |
| M.D./D.O. | 12 | 8 | 15 | 19 |
| D.V.M. | 8 | 4 | 4 | 8 |
| Other | 3 | 2 | 3 | 4 |
| TOTALS | 169 | 94 | 284 | 366 |

* information unavailable

The workforce as represented by the private sector in Wyoming is incomplete at present. This is attributable to the fact that the RHS Section does not have statuatory authority relative to X-ray registration and compliance. Registration, therefore, is voluntary.

The following table is an attempt to estimate the private sector workforce involved in radiation control activities in Wyoming. These estimates are pursuant to a study entitled An Analysis of Nuclear Related Technician Manpower in Western States conducted by Oak Ridge Associated Universities and the U.S. Energy Research and Development Administration (1975).

## TABLE XXIII

## STATE OF WYOMING

### Radiation Personnel
### Current (1976) Staffing Level
### (estimated)

| Position | 1976 |
|---|---|
| Radiation Control Technician | 16 |
| Radiochemistry Technician | 5 |
| Well Logging Technician | 52 |
| X-Ray Calibration Technician | 4 |
| Radiologic Technologist | 25 |
| Radiobiology Technician | 1 |
| TOTAL | 103 |

SOURCE: An Analysis of Nuclear Related Technician Manpower in Western States, Manpower Development Division, Oakridge Associated Universities, and U.S. Energy Research and Development Administration.

### C. Workforce Projections

The Radiologic Health Services Section is understaffed at present. Although increases in this staff are anticipated to be minimal, it is not unreasonable to project the overall increase in the Section from 1976 to 1982 of one professional and one secretarial. This would allow the present X-Ray Technician to be freed for full-time x-ray activities. The added Radiological Health Specialist would assist in the expanded activities pursuant to the "agreement" status with the Nuclear Regulatory Commission, as well as other responsibilities.

## TABLE XXIV

## DEPARTMENT OF HEALTH & SOCIAL SERVICES

### Division of Health and Medical Service
### Radiological Health Services Section
### Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| Radiological Health Specialist (Section Chief) | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Radiological Health Specialist | 0 | 0 | 1 | 1 | 1 | 1 | * | 20% |
| X-Ray Technician | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Secretarial | 0 | 0 | 1 | 1 | 1 | 1 | N/A | 20% |
| TOTAL | 2 | 2 | 4 | 4 | 4 | 4 | N/A | 20% |

* unavailable

The following table presents estimated workforce requirements to 1982 for the private sector. These estimations are the result of the best judgements of professionals working in the field of radiation control.

## TABLE XXV

## STATE OF WYOMING

### Radiation Personnel Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| Radiation Control Technician | 16 | 16 | 17 | 17 | 18 | 19 | * | 3% |
| Radiochemistry Technician | 5 | 5 | 5 | 5 | 5 | 5 | * | 0% |
| Well Logging Technician | 52 | 54 | 56 | 58 | 60 | 62 | * | 4% |
| X-Ray Calibration Technician | 4 | 4 | 4 | 4 | 4 | 4 | * | 0% |
| Radiological Technologist | 25 | 26 | 27 | 28 | 29 | 30 | * | 4% |
| Radiobiology Technician | 1 | 1 | 1 | 1 | 1 | 1 | * | 0% |
| TOTAL | 103 | 106 | 110 | 113 | 117 | 121 | * | 3% |

* unavailable

The greater percentage increases in the medical and dental fields will be in areas of the state where the populations are centered and where the larger medical facilities are developing. Wyoming as a mining and milling state will reflect smaller per annum increases in most of the positions listed in the above table, than other western states. This is due principally to the fact that exploration, drilling, mining and milling activities utilize fewer of the above mentioned personnel than the medical/dental fields.

## D. Training and Certification

The greatest percentage of the training which is accomplished by the Radiological Health Services Station is conducted during on-site visits to facilities. This training for the most part is on a one-to-one basis rather than group settings. During inspection visits, the staff may informally introduce corrective measures in an effort to lessen radiation risks and exposure. Improved techniques for film exposure and/or development have reduced the public's radiation exposure by fifty percent in the state.

During the previous year the RHS Section staff presented a seminar in Cheyenne for Dental Hygienists. Radiation hazards and protection were the topics of a seminar presented to the state's Radiological Technologists. Consulting services as well as technical assistance were provided for the Wyoming Occupational Health & Safety Agency.

The state staff attended seminars and meetings both in state and out of state regarding emergency response planning; the regulatory aspects of mining projects in the Powder River Basin; perpetual maintenance of uranium tailings; and, optimum X-ray survey techniques.

The following table details the available educational offerings in Wyoming, in the field of radiation control.

## TABLE XXVI

## STATE OF WYOMING

## Educational & Training Programs Radiation Control

| School/Facility | Course Offering |
|---|---|
| Laramie County Memorial Hospital, Cheyenne | Radiologic Technology |
| Veteran Administration Center, Cheyenne | Radiologic Technology |

SOURCE: An Analysis of Nuclear Related Technician Manpower in Western States, Oak Ridge Associated Universities and U.S. Energy Research and Development Administration, 1975.

Training for the radiation occupations has, to date, required residents of Wyoming to travel to out-of-state schools, for the most part.

### E. Career Potential

With the increase in energy related activities across the state and the increased population, career opportunities will be available to a limited degree in the radiation control field. Competition is expected to increase among radiation protection specialists and engineering graduates with radiation and nuclear expertise.

The U.S. Department of Interior has suggested that within the next few years there will be an increase in uranium mills and mines. Five uranium mills and thirteen uranium mines have been proposed for Wyoming. Although mining and milling do not necessitate large increases in radiation technicians, highly skilled engineers and health physicists will present areas of career opportunity as a result of these activities. Private industry will be the greatest area of opportunity while the state personnel should remain relatively static.

## F. Conclusion

The efforts on the part of the state Radiological Health Services staff have been extensive. These efforts have also been somewhat limited due to the constraints of staff size and statutory authority. Currently this limited staff allocates time to technical assistance and meetings involving pending radiation legislation. During the past year the staff met with the Wyoming Mining Assocation, Wyoming Minerals Association, the Governor and, the State Planning Coordinator regarding legislation. Statutory authority is needed in order for the RHS staff to be able to fully discharge radiation related responsibilities for the state.

The RHS staff also allocates time for responses to the U.S. Energy Research & Development Administration (ERDA). The staff works in conjunction with ERDA personnel to evaluate incidents. The staff also surveys abandoned uranium tailings piles and prepares subsequent remedial action plans.

Radiological health related problems will increase in Wyoming as the uses and users of radioactive materials continue to increase. In order to fulfill the increasing responsibilities delegated to the Radiological Health Services Section and to adequately contend with the state's radiological problems, additional personnel will be required over the next five years.

## VI. SOLID WASTE

### A. Introduction

Solid waste management has a relatively short history in Wyoming. Although solid waste management has not been a critical area of concern to the state in the past, this program should emerge as an integrated and ever more important element in the overall state plan for Wyoming. As with many other environmental questions, this increased importance will be as a direct and indirect result of energy resource development.

The primary responsibility for solid waste management in Wyoming has been allocated to the Department of Environmental Quality (DEQ) under the Wyoming Environmental Quality Act of 1973. Solid waste management, under the language of the Act, has been defined as a program rather than a division. This, however, affects only funding and is not indicative of the fact that the DEQ accords the Solid Waste Management Program the same status as a division.

The primary responsibility of the Program is the elimination of improper handling and disposal of solid waste. Authorization for the program is legislated under the previously mentioned Act, section 35-502.42-44.

The recently promulgated rules and regulations as set forth by the Department and the Program classify various types of solid waste facilities across the state. The following briefly outlines the types of operations:

- Type I: accomplished by sanitary landfill, incineration, composting or other. Facilities serve a minimum of 3,000 population or process a minimum of 2,100 tons per year.

- Type II: accomplished by modified landfill or other means termed acceptable by the Department. Facilities serve a population less than 3,000 but more than 1,000.
- Type III: accomplished by modified landfill or other departmentally acceptable means. Facilities serve a population of less than 1,000.
- Construction/Demolition/Breech Fill.
- Industrial Landfill.
- Hazardous Waste Facility.

## B. Workforce Profile

The Solid Waste Management Program of the DEQ is currently composed of one Solid Waste Coordinator and one Secretary, as seen in the following table.

TABLE XXVII

DEPARTMENT OF ENVIRONMENTAL QUALITY

Solid Waste Management Program
Current (1976) Staffing Level

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Program Coordinator | 1 | 0% |
| Secretarial | 1 | 0% |
| TOTAL | 2 | 0% |

The responsibilities of the program are extensive and include the following:

- enforcement of rules and regulations;
- training of state-wide solid waste personnel;
- providing of technical assistance to state and local personnel;

- fulfilling of public relations/educational role relative to proper solid waste methods; and,
- advisory capacity to state government officials with regard to current technical information, etc.

No exact figures are presently available as to the statewide workforce. The DEQ Solid Waste Coordinator has estimated, however, that there may be a total of 250 persons presently working in solid waste in Wyoming.

## C. Workforce Projections

It is extremely difficult to project manpower allocations for this program. It has been termed the "Stepchild of DEQ." In an effort to carry out the stated objectives of the program, three positions were requested for the Solid Waste Program during the FY 1975 biennial legislative session. These legislative requests included: one Engineer, one Environmental Specialist with a degree in Biology, and one secretary. The secretarial position was granted. Therefore, the program is viewed as being currently two professionals short. With a program of this size, this may be considered a significant staffing shortage. These positions will undoubtedly be requested during the FY 1977 biennial legislative term. A definite staffing need has been established, but the question lingers as to the sympathies of the Legislature.

As to the state-wide projections for workforce requirements over the next five years, no firm figures were available at this time. The DEQ believes that the present statewide workforce could triple or quadruple over the next five years due to energy-related activities. This will be especially noticeable in the impending energy-related impact on small towns, and the very real possibility of the creation of towns aroung mining and milling sites where none now exist. The recent passage of P.L. 94-580 the Resource Conservation & Recovery Act will also be a contributing factor in the statewide workforce increases.

### D. Training and Certification

The DEQ this year is to receive a grant from EPA in order to present two to four training seminars each of one day duration. These seminars will be presented to approximately 100 persons within the solid waste field in the state. These people are already working in the field and these seminars are aimed at upgrading their skills level. Also, these seminars will increase the workers' level of educational awareness as to the particular site. Safety precautions will be included as important aspects of this training.

### E. Career Potential

Career opportunities will definitely exist in the solid waste management field in Wyoming. These may be accentuated if energy development proceeds at the pace forecast by some experts. The up-grading of educational and technical skills will be important. Job opportunities for engineers with hazardous and toxic waste expertise will be available in private industry and government. The acceleration of uranium activities within the state will increase opportunities in the field of solid waste.

## F. Conclusion

The Solid Waste Management Program is understaffed. The breadth of the program responsibilities and the recorded efficiency of the staff are a tribute to the Program and to the DEQ. The advent of the new Resource Conservation and Recovery Act will add further to the responsibilities of this Program. Additional staff are a necessity within the near future.

## VII. WASTE WATER

### A. Introduction

There are several agencies which are involved in wastewater activities in the State of Wyoming. The lead agency has been identified as the Department of Environmental Quality (DEQ). The Wyoming Department of Agriculture is currently involved in extensive activities involving this environmental area.

The Wyoming Conservation Commission (a commission of the Department of Agriculture) assists the thirty-nine conservation districts within the state. The Commission guides and assists in the development and administration of conservation programs for urban and rural areas of the state. The Conservation Commission and the Department of Environmental Quality are developing a contract and a workplan regarding the P.L. 92-500, Section 208, Water Quality Planning Program. There are six non-designated areas in Wyoming:

- North Platte Basin: Carbon, Natrona, Converse, Albany, Platte, and Goshen Counties.
- South Platte River Basin: Laramie County.
- Wind River Basin: Fremont County.
- Belle Fourche and Cheyenne River Basin: Crook, Niobrara and Weston Counties.
- Upper Green River Basin: Sublette County.
- Big Horn River Basin: Big Horn, Park, Washakie and Hot Springs Counties.

The Conservation Commission will be involved in the assessment protion of the Section 208 program. The Commission is also involved in

P.L. 92-500, Section 404, Dredge and Fill. Under P.L. 566, Small Watershed Projects, the Commission assists local sponsors in conservation of watershed soil resources; the protection of property from flood, management of agricultural waters and provisions for recreational opportunities are also part of the Watershed Projects. Six small watershed projects have been completed in the state with six others in various stages of construction and/or planning.

As mentioned above, the major responsibility for waste water in Wyoming has been allocated to the Department of Environmental Quality (DEQ), the Water Quality Division. Authority has been granted under the Environmental Quality Act of 1973.

The Department of Environmental Quality has defined the prevention of further water pollution as the Division's primary goal. To this end, monitoring and discharge permit issuance is ongoing. Exhaustive efforts are made in the area of waste water treatment plant operator training and operation and maintenance.

Problems are prevalent in existing waste water treatment facilities; primarily, increases in these problems are energy related. Natural runoff and return flows from agricultural irrigation projects are currently the major source of water pollution in the state. Construction projects, mining and other agricultural activities are major contributors to these problems.

There are currently (1976) 159 waste water treatment facilities in Wyoming. The following table details these facilities according to treatment and classification.

## TABLE XXVIII

## STATE OF WYOMING

### Waste Water Treatment Facilities - 1976 Illustrating Treatment and Classification

| TREATMENT | CLASSIFICATION A | B | C | D | E* | TOTAL |
|---|---|---|---|---|---|---|
| Ponds | 1 | 1 | 8 | 51 | 1 | 62 |
| Aerated Ponds | 0 | 0 | 1 | 2 | 0 | 3 |
| Aeration Settling & Ponds | 1 | 0 | 0 | 0 | 0 | 1 |
| Aeration Ditch | 0 | 0 | 1 | 0 | 0 | 1 |
| Imhoff & Ponds | 0 | 0 | 0 | 1 | 0 | 1 |
| Imhoff Tank | 0 | 0 | 0 | 2 | 0 | 2 |
| Lagoon | 0 | 0 | 0 | 2 | 2 | 2 |
| Septic Tank | 0 | 0 | 0 | 8 | 24 | 32 |
| Septic Tank, No Treatment | 0 | 0 | 0 | 0 | 2 | 2 |
| Extended Aeration | 1 | 2 | 1 | 4 | 1 | 9 |
| Clarifier & Ponds | 0 | 0 | 1 | 0 | 0 | 1 |
| Oxidation Ditch, Aeration & Chlorination | 0 | 0 | 2 | 0 | 0 | 2 |
| Settling Digestors (Secondary) | 4 | 1 | 0 | 0 | 0 | 5 |
| Secondary | 1 | 1 | 0 | 0 | 0 | 2 |
| Settling Aeration Digestion | 1 | 0 | 0 | 0 | 0 | 1 |
| Unidentified, No Treatment | 0 | 0 | 0 | 0 | 1 | 1 |
| Unidentified | 0 | 2 | 3 | 5 | 14 | 24 |
| Irrigation System | 0 | 0 | 1 | 0 | 0 | 1 |
| Package Plant | 0 | 0 | 4 | 1 | 1 | 6 |
| Mechanical Plant | 0 | 0 | 1 | 0 | 0 | 1 |
| TOTAL | 9 | 7 | 23 | 76 | 44 | 159 |

* unclassified

As mentioned in Section IV entitled "Potable Water," the Water Quality Division has divided the state into water quality division areas. These areas and an organizational chart are found in the following pages.

## B. Workforce Profile

The following table details the workforce profile for the DEQ Water Quality Division. The DEQ ordinarily does not differentiate personnel time allocated to waste water as separated from water supply. The following table, however, is an attempt.

TABLE XXIX

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Quality Division
Waste Water Personnel
Current (1976) Staffing Level

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Water Quality Administrator | 1 | 65% |
| Environmental Engineer | 6 | 0% |
| Environmental Specialist | 9 | 0% |
| Training Officer | 1 | 0% |
| Secretarial | 7 | N/A |
| TOTAL | 24 | N/A |

It is noted that the Administrator and the Training Officer each allocate time (approximately 45%) to the drinking water areas.

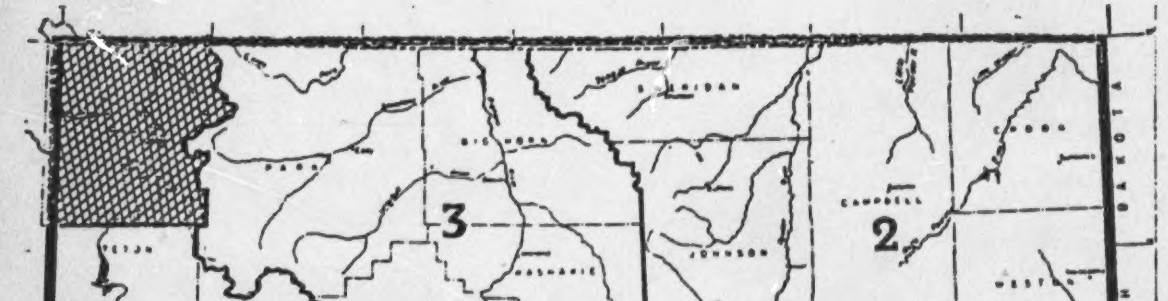
The following table describes the waste water treatment plant operating personnel. It is noted that classification A is the highest level of certification.

## STATE OF WYOMING

## DEPARTMENT OF ENVIRONMENTAL QUALITY

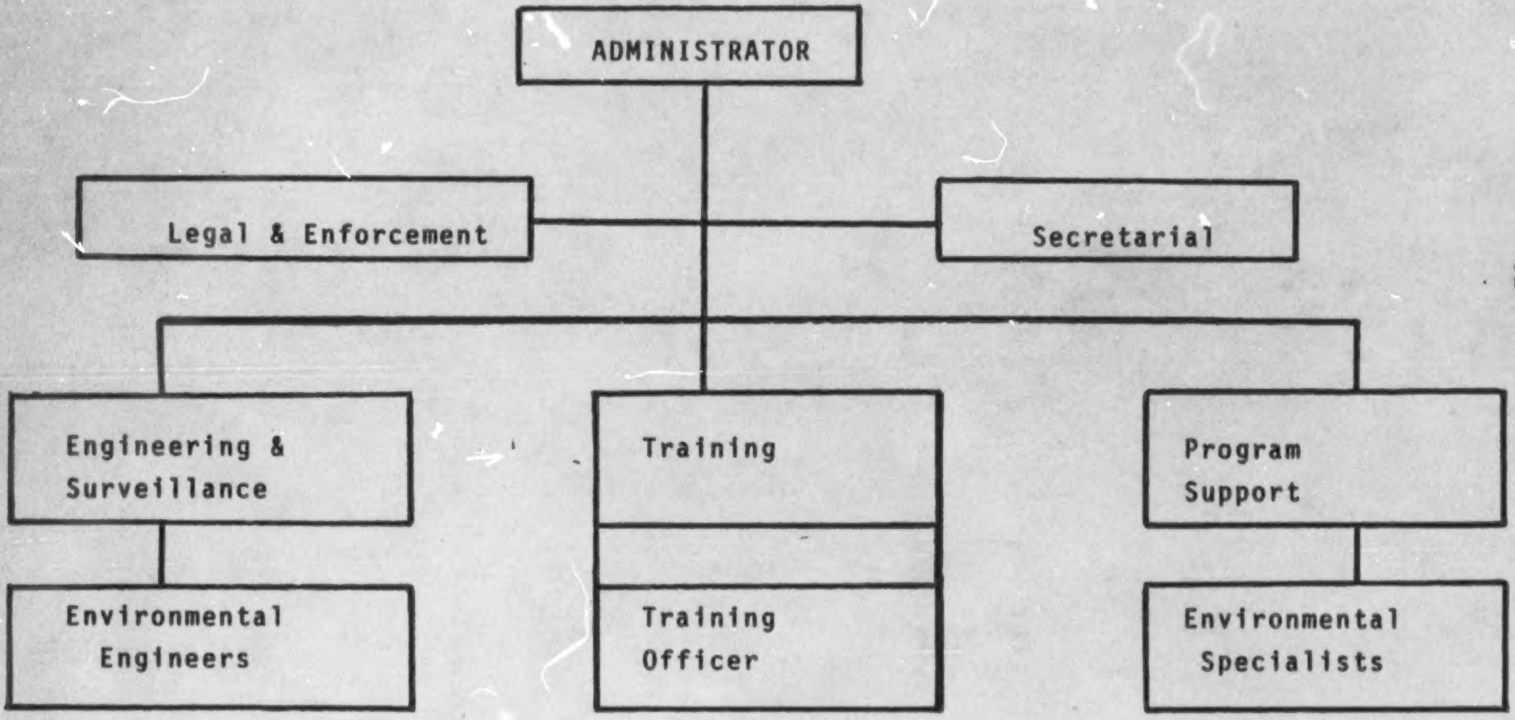
## WATER QUALITY DIVISION AREAS

Figure 13



## STATE OF WYOMING

Figure 14



DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

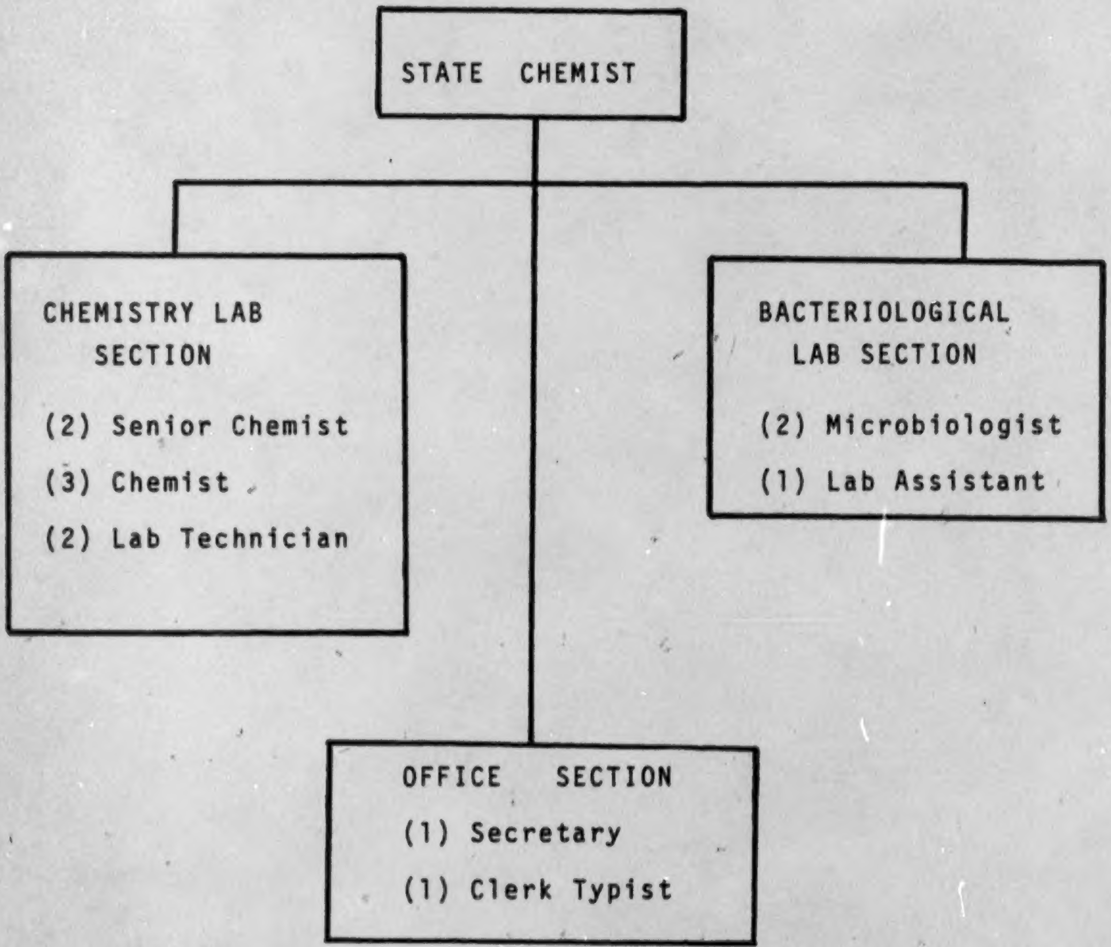
WATER QUALITY DIVISION: Potable Water & Waste Water

# STATE OF WYOMING

## DEPARTMENT OF AGRICULTURE

## DIVISION OF LABORATORIES

Figure 15



## TABLE XXX

## STATE OF WYOMING

## Waste Water Treatment Plant Operating Personnel Current (1976) Staffing Level

| Class | 1976 | %/annum turnover (average) |
|---|---|---|
| A | 5 | 1% |
| B | 8 | 15% |
| C | 62* | 40% |
| D | 94* | 45% |
| TOTAL | 169 | 25.5% |

* estimated

### C. Workforce Projections

A one to two percent per annum increase is anticipated for the waste water personnel of the DEQ Water Quality Division. Although the turnover rate is relatively low, it is anticipated that the majority of the estimated staff increases will be the result of new hires as the program is strengthened.

Extensive coal development and increases in uranium mining and milling along with increased population related problems will necessitate an increase in waste water treatment plant operating personnel. The table below details the anticipated increases in the operator category to 1982.

## TABLE XXXI

## STATE OF WYOMING

### Waste Water Treatment Plant Operating Personnel
### Workforce Projections to 1982 (est.)

| Class | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| A | 5 | 5 | 6 | 6 | 7 | 7 | 1% | 5% |
| B | 8 | 8 | 9 | 9 | 10 | 10 | 15% | 5% |
| C | 62 | 69 | 77 | 86 | 96 | 108 | 40% | 12% |
| D | 94 | 108 | 124 | 143 | 164 | 189 | 45% | 15% |
| TOTAL | 169 | 190 | 216 | 244 | 277 | 314 | 25.5% | 13% |

### D. Training and Certification

Extensive training efforts in the waste water field have been ongoing in Wyoming since 1975. Prior to that time, there was no formal training. The training staff is composed of one Training Officer. Upon occasion, experts are provided from the ranks of the EPA Region VIII office and out-of-state consulting personnel. Most often, this expertise is available for the week-long training schools. As in other states, the training of operators includes the basics of mathematics and the sciences. More advanced technological and operating assistance is also part of the curriculum.

Extensive curriculum materials have been developed through the expertise of the Training Officer. Technical assistance, television video tapes, cassettes as well as individual and mobile lab programs are offered. These include up-grade training. Usually, one three day session and two one-week sessions are presented throughout the year. The certification testing takes place following the week long schools. The Training

Officer works cooperatively with Casper College and has also utilized University of Wyoming expertise. A great deal of on-site technical assistance (operations and maintenance) is available. Through extensive state-wide travel and trouble shooting, these efforts are quite substantial on the part of the Training Officer.

The following details the training for fiscal year 1976.

TABLE XXXII

STATE OF WYOMING

Waste Water Training
(1976)

| Sponsor | Date | Length | Program | Number Trained | Number Certified |
|---|---|---|---|---|---|
| DEQ Training Officer | 10/75 | 1 week | Operators School | 122 | 31 |
| DEQ Training Officer | 4/76 | 1 week | Operators School | 95 | 40 |
| DEQ Training Officer | 10/76 | 1 week | Operators School | 47 | 22 |

### E. Career Potential

Career opportunities in the waste water field will increase. These occupational opportunities will include all classifications of operators as well as the degreed technical and administrative categories.

## F. Conclusion

Extensive training efforts are resulting in the upgrading of plant personnel and the certification of operators pursuant to the state law. It is strongly believed that contributory efforts are needed from the federal and state level for assistance to the DEQ Water Quality Division. This may be seen as especially necessary as energy resources are developed at an ever accelerating rate.

In order to fully discharge their waste water responsibilities, staff and program upgrading and increases are recommended for the Department of Environmental Quality.

The Department of Agriculture (Conservation Commission) efforts are outstanding in light of an exceptionally small staff which totals three. Although the program and project activities are strong, some increases in staff are recommended. An addition of one agricultural engineer would enhance the staff efforts.

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NOTE: Subsequent to the writing of this report, the Conservation Commission and the Department of Environmental Quality (DEQ) have developed a subagreement to the Statewide 208 Work Plan. This subagreement specified that the Conservation Commission will do non-point source assessment work in Albany, Carbon, Converse, Crook, Fremont, Goshen, Laramie, Natrona, Niobrara, Platte, Sublette, and Weston Counties.

## VIII. ENERGY

### A. Introduction

There are innumerable programs, offices and agencies currently involved in energy-related activities in Wyoming. The development of energy resources, especially coal and uranium, is closely aligned with problems which impact the environment. In the case of Wyoming, land and water are more affected by this exploration and extraction process than is air quality.

According to the Seventh Annual Report of the Council on Environmental Quality, entitled Environmental Quality - 1976, the State of Wyoming has established a program which allows for the coordination of state land use related problems. Wyoming requires local governments to establish land use planning (i.e., zoning, and planning commission). In conjunction with the land use program, the state has the authority to determine the siting of power plants, and has adopted a tax measure to give property tax relief to owners of agricultural or open space lands.

The Department of Environmental Quality (DEQ) has, under the 1973 Act, created a Land Quality Division. The primary goal of the Division is the planning, design and management of mining and reclamation lands.

The Wyoming Department of Agriculture in conjunction with the Wyoming Industrial Siting Council, the DEQ, the State Conservation Commission and the State Land Use Commission, endeavors cooperatively to impact all Wyoming land use changes.

The Wyoming Conservation Commission (Department of Agriculture) has extensive reclamation and conservation projects. The Commission assists mining companies in developing reclamation plans, and offers conservation planning statewide. Resource conservation is widely promoted in conjunction with the Department of Economic Planning and Development and the U.S. Soil Conservation Service.

### B. Workforce Profile

The DEQ Land Quality Division is primarily responsible for creating a productive and desirable environment for all mineral mined lands in the state. In order to fulfill these responsibilities the Division issues permits and licenses to mine and to explore. The Division solicites public review of proposed mining plans.

Recently the State of Wyoming signed an agreement with the U.S. Department of Interior. This agreement will give the state responbility for reclamation activities on federal lands. The administration of this agreement has been delegated to the Department of Environmental Quality, Land Quality Division.

Acting in an advisory capacity to the Department and the Division, is the Land Quality Advisory Board. As with other DEQ boards the members are appointed by the Governor and are representative of the sectors which depict Wyoming's socio-economic structure. The following table details the workforce of the Division.

## TABLE XXXIII

## DEPARTMENT OF ENVIRONMENTAL QUALITY

### Land Quality Division
### Current (1976) Staffing Level

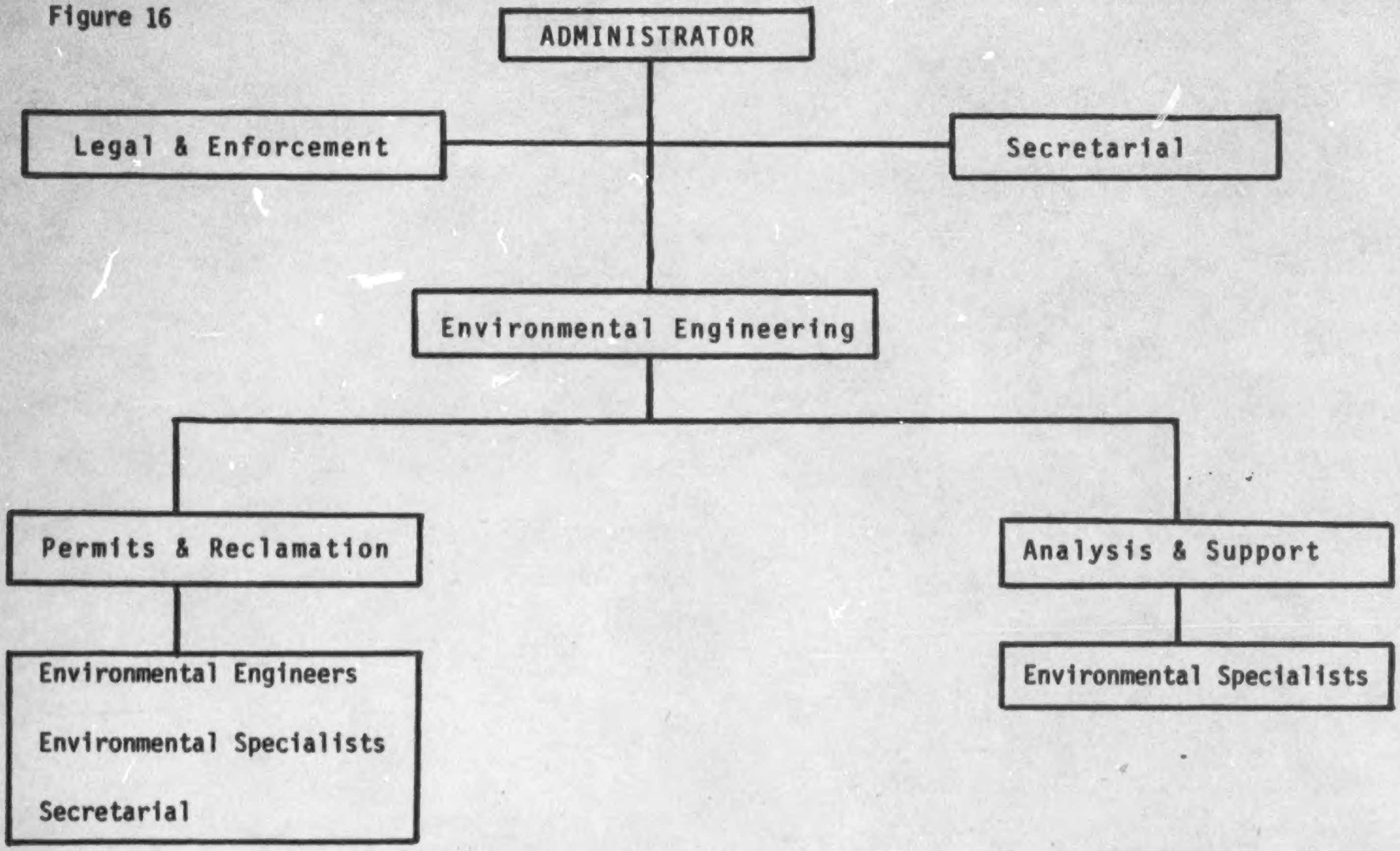
| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Land Quality Administrator | 1 | 0% |
| Environmental Engineer | 4 | 0% |
| Environmental Specialist | 8 | 12% |
| Secretarial | 5 | N/A |
| TOTAL | 18 | N/A |

On the following pages will be found an organizational chart of the Department of Environmental Quality, Land Quality Division for the State of Wyoming, and a map detailing the Land Quality Division Areas within the state.

The Wyoming Oil & Gas Conservation Commission issues drilling permits across the state, and through bonding ($5,000 per well) ensures that abandoned wells are properly capped or plugged. Four Commissioners and the Governor hear disputes between an operator and the Commission. Protection of the land and underground water sources are secondary activities of the Commission. The table following Figures 16 and 17 depicts the current staffing levels of the Commission.

## STATE OF WYOMING

Figure 16



DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

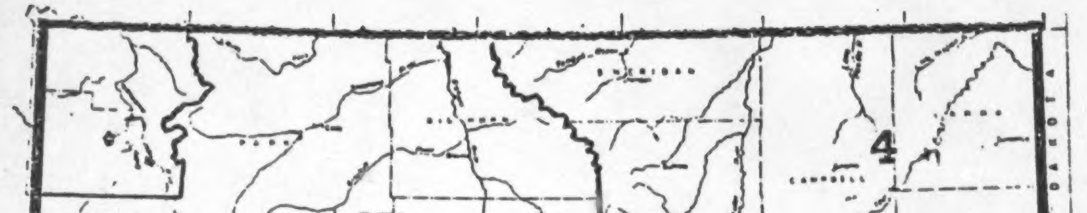
LAND QUALITY DIVISION

## STATE OF WYOMING

## DEPARTMENT OF ENVIRONMENTAL QUALITY

## LAND QUALITY DIVISION AREAS

Figure 17



## TABLE XXXIV

## WYOMING OIL & GAS COMMISSION

### Current (1976) Staffing Level

| Position | 1976 | %/annum turnover (average) |
|---|---|---|
| Oil & Gas Supervisor | 1 | * |
| Petroleum Engineer | 2 | * |
| Petroleum Technician | 2 | * |
| Secretarial | 7 | N/A |
| TOTAL | 12 | N/A |

* unavailable

### C. Workforce Projections

The DEQ Land Quality Division will experience staffing increases over the next few years. These increases will be most apparent during 1977 and 1978. The additional staff will be required in order for the Division to execute newly designated responsibilities as defined in the terms of Wyoming's recent agreement with the Department of Interior. Under this agreement the Land Quality Division will bear the major responsibility for overseeing reclamation activities on federal lands within the state. Degreed persons with various areas of expertise will make up this new workforce element of the Division.

The following table details the anticipated growth in the Land Quality Division to 1982. Environmental engineers will exhibit the most marked increase, growing from four to fourteen by the end of the five year period.

TABLE XXXV

DEPARTMENT OF ENVIRONMENTAL QUALITY

Land Quality Division
Workforce Projections
to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum turnover (average) | %/annum growth (average) |
|---|---|---|---|---|---|---|---|---|
| Land Quality Administrator | 1 | 1 | 1 | 1 | 1 | 1 | 0% | 0% |
| Environmental Engineer | 4 | 11 | 13 | 14 | 14 | 14 | N/A | 40% |
| Environmental Specialist | 8 | 8 | 8 | 8 | 8 | 8 | 12% | 0% |
| Ajudication Personnel | 0 | 1 | 1 | 1 | 1 | 1 | N/A | 20% |
| Secretarial | 5 | 5 | 5 | 6 | 6 | 6 | N/A | 4% |
| TOTAL | 18 | 26 | 28 | 30 | 30 | 30 | N/A | 12% |

The Wyoming Oil & Gas Commission workforce appears adequate for the present. As drilling activities increase and the state's energy resources are further extracted, this staff should experience minimal increases.

## D. Training and Certification

Training for the scientific and engineering personnel is conducted through the University of Wyoming. A limited amount of in-house training is available for DEQ personnel.

## E. Career Potential

Career opportunities will be available throughout the state. The job categories will be representative of highly skilled, degreed level positions. Technician level occupations should also be available but to a lesser degree.

Specialized engineering and geological skills will be in demand. Expertise relative to Environmental Impact Statements will be sought by the industrial sector as well as by state and local agencies.

## F. Conclusion

The energy related activities on-going in Wyoming present new challenges to this sparsely populated western state. Coal continues to be exported by rail, at the rate of forty trains per day averaging one hundred cars each.

For forty years the Wyoming Rural Electric Association organized farmers and built lines to supply electricity where previously none were available. As the administrative head of fourteen rural cooperative electrical units, the Association is today faced with the problem of creation of new sources. Electricity is essential to the state's developing coal, oil and mineral industries. Agricultural uses of electricity continue to increase.

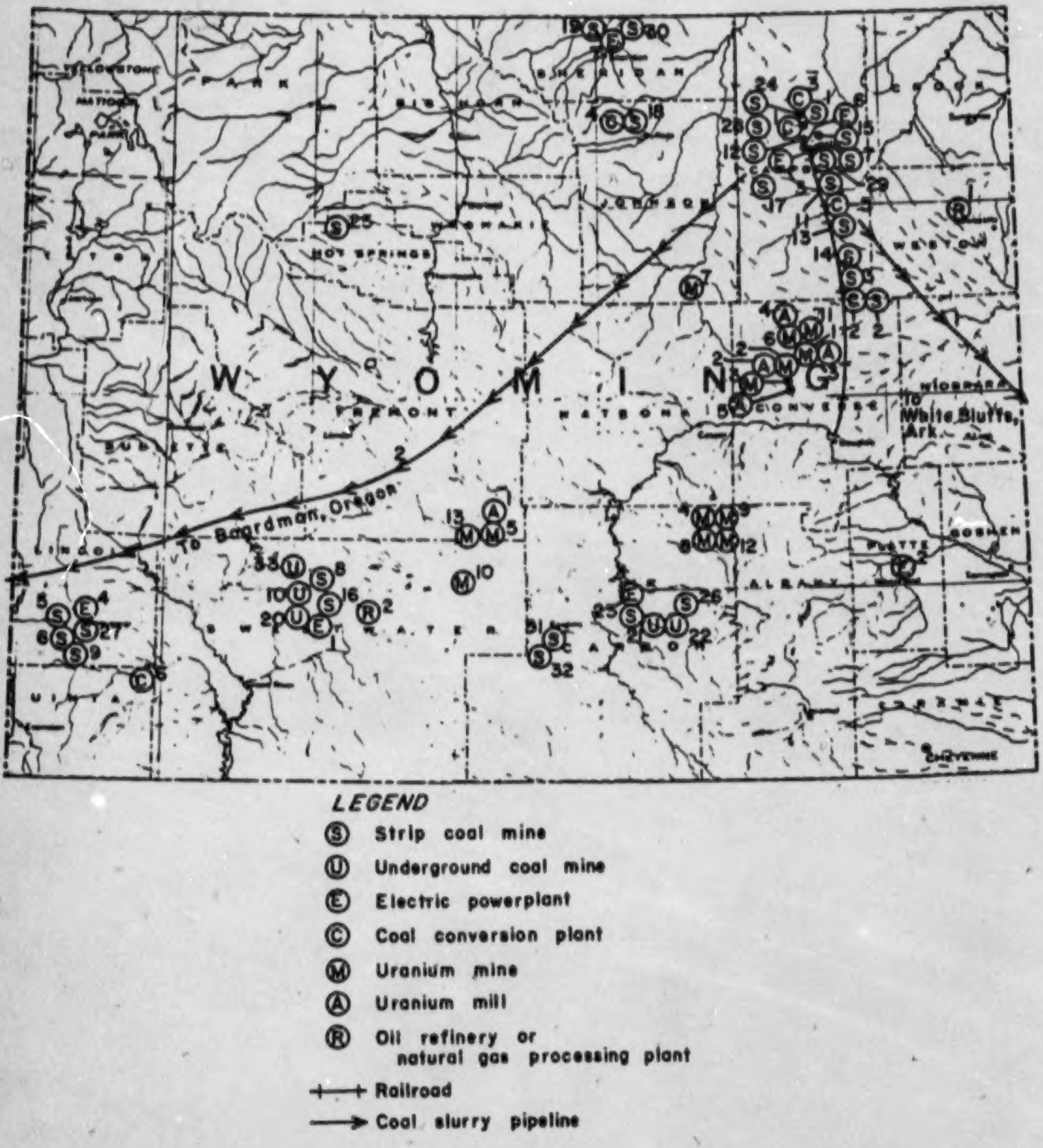
In order to meet the problem of new sources of electricity, a unique and cooperative approach to regional power planning is presently under construction in Wyoming. The Missouri Basin Power Project (MBPP) will consist of a 1,500,000 kilowatt generating plant, the Laramie River Station near Wheatland, the Grayrocks Reservoir on the Lower Laramie River and the necessary transmission facilities interconnecting to transport the power regionally. The Wyoming Rural Electric Association is a leading participant of this venture.

MBPP participants are working effectively to minimize environmentally disruptive effects of the power facility. During the peak construction phase, 2,000 workers will be employed. Upon completion, 200 permanent employees will remain. Extensive environmental planning will ensure against the all too familiar "aluminum ghettos" (trailer communities).

The Grayrocks Reservoir on the Lower Laramie River will be multi-purpose project which may potentially irrigate thousands of acres of Goshen County farmland. Water from Grayrocks will be utilized by the Wheatland plant for steam supply and evaporative cooling. The Wheatland plant (or the Laramie River Station) will be a "zero discharge" facility. In other words, no water will be returned to the reservoir or to the river. Environmental considerations have been an integral part of the plant planning from its conception. The first of the three proposed 500,000 kilowatt units is now under construction. It is estimated that an excess of one billion dollars will be spent on pollution control equipment to protect the environment of the area. Energy resource development and conversion can take place without destruction and permanent disruption of the environment.

FUELS RELATED PROJECTS

Figure 18



SOURCE: Projects to Expand Fuel Sources in Western States.
Washington, D. C., Bureau of Mines, 1976.

# Selected Post Secondary Institutions With Formal Environmental Energy Programs

Four years prior to statehood and 18 years after the establishment of the Territory of Wyoming, in a single building with a total of five professors, the University of Wyoming was founded. The new university enrolled 42 students.

Today, there are 8,100 students, a ratio of 145 students to one faculty member. There are 180 programs of study offered in seven academic colleges: Agriculture; Arts and Sciences; Commerce and Industry; Education; Engineering; Health Sciences; and Law.

The University of Wyoming, College of Agriculture offers a Bachelor of Science degree with a major in several fields including Entomology and Range Management. The College of Agriculture also conducts research on land reclamation and presents courses relative to strip mining.

The Range Management program, when first started, was entitled Agronomy and Agriculture Ecology. This program is outlined in the following pages.

The University of Wyoming, however, offers other environmentally related courses of study. A graduate program leading to the degrees of Master of Science and Doctor of Philosophy is available through the Department of Atmospheric Science. The Department of Civil and Architectural Engineering offers a Bachelor's, Master's and Doctorate in Civil Engineering. Several special areas of study included under Civil Engineering are Environmental Engineering, Water Resource Engineering and Transportation Engineering.

Environmental Engineering includes the development of water supplies, the design and construction of water supply systems and treatment plants, industrial waste stabilization, the processes involved in the collection and treatment of sewage, air pollution and the controls and effects of radiation.

Water Resource Engineering includes the use, control and transportation of water. Irrigation, drainage, flood control, navigation, hydro-electric power generation, and atmospheric science utilization are also major components of this program.

Transportation Engineering is an area which is becoming an increasingly important area of emphasis in environmental planning. Transportation Engineering includes not only highways, streets, railroads, and harbors but pipelines, airports and air transportation.

A University-wide organization established to conduct research related to water resources is the Wyoming Water Resource Research Institute (WRRI). The WRRI has established three outdoor resource observatories which are an integral part of this program. Currently the Institute has undertaken research relative to the disposal of sewage. This work is being conducted in cooperation with the State Department of Agriculture.

Since 1945, seven community colleges have been established in Wyoming. The establishment of Casper College, the first two year institution in the state, was followed by Powell, Sheridan, Torrington, Western Wyoming (Rock Springs), Central Wyoming (Riverton), and Laramie County (Cheyenne).

The information which follows presents an overview of the environmental programs across the state at the post-secondary level. The data were retrieved by means of catalog review and telephone survey.

University of Wyoming
Laramie, Wyoming

Programs: Agriculture (B.S.), Range Management (M.S., Ph.D.)

Hours required for major: 132
Program Inception: 1948
Staff Size: Four full professors and one associate professor (5 Ph.D.)
Enrollment: 59 undergraduates and 30 graduates
Graduates (1976): 8 (B.S.) and 2 graduate
Placement: Not available
Graduate Work: Not available

Courses

Principles of Range Management
Range Ecosystems and Plants
Introduction to Range Recreation
Range Grasses
Range Judging
Revegetation of Strip Mined Lands
Range Utilization and Improvement
Range Survey
Quantitative Methods of Range Analysis
Range Plant Distribution
Vegetative Influences
Graduate Seminar
Investigation
Field Application of Range Management Techniques
Photo Interpretation for Range and Forest Studies
Range Resource Ecology
Seminar
Problems

## COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Casper College
Casper, Wyoming

Program: Environmental Health (A.S.)

Hours required for major: Semester - 62
Program Inception: 1973
Staff Size: Five professors (2 Ph.D., 3 M.S.)
Enrollment: 35
Graduates (1976): 3
Placement: not available
Graduate Work (B.S.): 3

### Courses

Environmental Biology
Elementary Forestry
Fundamentals of Water Treatment
Water Treatment
Wastewater Treatment
Water and Wastewater Analysis
Environmental Education Workshop
Natural History of Vertebrates
Genetics
Bacteriology
Pathogenetic
Physiology

# State Legislation

# WYOMING GENERAL

## TITLE:

Wyoming Environmental Quality Act
Wyoming Statutes 35-502.1

## PURPOSE:

To enable the state to prevent, reduce and eliminate pollution; to preserve and enhance the air, water and reclaim the land of the state; and to provide for the comprehensive planning for environmental quality of the state.

## DEFINITIONS:

### GENERAL:

1. Department
2. Council
3. Director
4. Board
5. Administrator
6. Person
7. Aggrieved party
8. Interstate agency
9. Municipality
10. Point source
11. This act

### AIR QUALITY

1. Air contaminant
2. Air pollution
3. Emission

### WATER QUALITY:

1. Pollution
2. Wastes
3. Sewage system
4. Treatment works
5. Disposal system
6. Waters of the state
7. Discharge
8. Public water supply

### SOLID WASTE:

1. Solid waste

LAND QUALITY

1. Reclamation
2. Minerals
3. Contouring
4. Overburden
5. Underground mining
6. Pit
7. Adjacent land
8. Operation
9. Operator
10. Surface mining
11. Mining permit
12. Spoil pile
13. License to mine for minerals
14. Topsoil
15. Exploration by dozing
16. Affected land
17. Refuse

ADMINISTERING AUTHORITY:

Department of Environmental Quality
Environmental Quality Council

AUTHORIZATIONS:

To issue regulations and enforce the act;
To establish all permit standards;
To undertake studies and investigations relating to environmental quality;
To enter and inspect property in enforcement of the act;
To issue and administer all permit programs;
To establish ambient air quality standards;
To establish effluent limitation standards for water pollution;
To establish land reclamation standards;
To coordinate all solid waste management and disposal activities;
To issue variances from the act and regulations.

CERTIFICATION OR LICENSING:

Permits required for construction, installation, modification or operation of public water supply system, sewerage system, treatment works or facility;
Mining permit required for all mining activities, issued only when accompanied by detailed information, protection guarantees, and comprehensive reclamation plan;
License to mine is required of all mining operators;
Special license for mineral exploration.

PROHIBITED ACTS:

To emit air contaminants in violation of standards;
To engage in any activity for which a license or permit is required without having the proper license or permit;
To do any act in violation of a proper permit or license.

PENALTIES:

Normal violations - fine of up to $10,000;
Willful violations - first offense - fines up to $25,000 and one year imprisonment;
Willful violations - subsequent offenses - fines of up to $50,000 and two years imprisonment;
False statement violations - fines of up to $10,000 and six month imprisonment;
Violations causing wildlife death - normal penalty plus replacement value of wildlife.

# WYOMING PESTICIDES

## TITLE:

Wyoming Environmental Pesticide Control Act
Wyoming Statutes 35-262.1

## PURPOSE:

To regulate, for the public interest, the labeling, distribution, storage, transportation, disposal, use and application of pesticides to control pests; and to provide for the registration of pesticides and devices.

## DEFINITIONS:

1. Certified applicator
2. Commercial applicator
3. Private applicator
4. Board of Agriculture
5. Device
6. Pesticide
7. Restricted use pesticide

## ADMINISTERING AUTHORITY:

Department of Agriculture
Board of Certification

## AUTHORIZATIONS:

To require the registration of all pesticides and devices;
To certify applicator regarding restricted use pesticides;
To issue regulations pursuant to the act;
To issue experimental use permits;
To enforce the act through license and permit cancellations and suspensions;
To enter and inspect property to enforce the act.

CERTIFICATION OR LICENSING:

All commercial and private applicators must be certified according to standards and classifications developed by regulations.

PROHIBITED ACTS:

To use restricted use pesticides without proper certification;
To fail to register pesticides and devices;
To discard, transport, or store pesticides or containers in a manner which harms environment.

EXEMPTIONS:

Use of pesticides for personal use;
No registration of non-commercial devices.

PENALTIES:

First offense - fines up to $500 and one year in jail;
Subsequent offenses - fines up to $1000 and one year in jail.

## WYOMING RADIATION

TITLE:

Radioactive Isotopes Law
Wyoming Statutes 35-3

PURPOSE:

To provide for the registration and control of radioactive materials and isotopes.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Department of Public Health

AUTHORIZATIONS:

To require the registration of all locations where radioactive isotopes and materials are ued, manufactured, processed, packaged, refined, produced, or disposed of;
To issue registration certificates and regulations pursuant to the act.

PROHIBITED ACTS:

To fail to register locations of radioactive isotopes or materials.

PENALTIES:

Fines of up to $100.

NRC AGREEMENT STATE: NO